SVENSK STANDARD

SS-EN IEC 60947-6-1, utg 3:2023

Fastställd	Sida	Ansvarig kommitté
2023-10-18	1 (70)	SEK TK 121A

Kopplingsapparater för högst 1000 V – Del 6-1: Flerfunktionsapparater – Nätomkopplare

Low-voltage switchgear and controlgear – Part 6-1: Multiple function equipment – Transfer switching equipment

Som svensk standard gäller europastandarden EN IEC 60947-6-1:2023. Den svenska standarden innehåller den officiella engelska språkversionen av EN IEC 60947-6-1:2023.

Nationellt förord

Europastandarden EN IEC 60947-6-1:2023

består av:

– **europastandardens ikraftsättningsdokument,** utarbetat inom CENELEC
– **IEC 60947-6-1, Third edition, 2021 - Low-voltage switchgear and controlgear – Part 6-1: Multiple function equipment – Transfer switching equipment**

utarbetad inom International Electrotechnical Commission, IEC.

Tidigare fastställd svensk standard SS-EN 60947-6-1, utg 2:2005 med eventuella tillägg, ändringar och rättelser gäller ej fr o m 2026-05-19.

ICS 29.120.40; 29.130.20

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Arbetet i de tekniska kommittéerna är öppet för alla svenska organisationer, företag, institutioner, myndigheter och statliga verk. Den årliga avgiften för deltagandet och intäkter från försäljning finansierar SEKs standardiseringsverksamhet och medlemsavgift till IEC och CENELEC.

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN IEC 60947-6-1

May 2023

ICS 29.130.20; 29.120.40

Supersedes EN 60947-6-1:2005; EN 60947-6-1:2005/A1:2014

English Version

Low-voltage switchgear and controlgear - Part 6-1: Multiple function equipment - Transfer switching equipment (IEC 60947-6-1:2021)

Appareillage à basse tension - Partie 6-1: Matériels à fonctions multiples - Equipement de transfert de source (IEC 60947-6-1:2021)

Niederspannungsschaltgeräte - Teil 6-1: Mehrfunktionsschaltgeräte - Netzumschalter (IEC 60947-6-1:2021)

This European Standard was approved by CENELEC on 2021-04-20. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Ref. No. EN IEC 60947-6-1:2023 E

SEK Svensk Elstandard

SS-EN IEC 60947-6-1, utg 3:2023

European foreword

The text of document 121A/403/FDIS, future edition 3 of IEC 60947-6-1, prepared by SC 121A "Low-voltage switchgear and controlgear" of IEC/TC 121 "Switchgear and controlgear and their assemblies for low voltage" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 60947-6-1:2023.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2023-11-19
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2026-05-19

This document supersedes EN 60947-6-1:2005 and all of its amendments and corrigenda (if any).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under a Standardization Request given to CENELEC by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s) / Regulation(s).

For the relationship with EU Directive(s) / Regulation(s), see informative Annexes ZZA and ZZB, which are an integral part of this document.

Any feedback and questions on this document should be directed to the users' national committee. A complete listing of these bodies can be found on the CENELEC website.

Endorsement notice

The text of the International Standard IEC 60947-6-1:2021 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standard indicated:

IEC 60034-12:2016	NOTE	Approved as EN 60034-12:2017 (not modified)
IEC 60079 (series)	NOTE	Approved as EN IEC 60079 (series)
IEC 60364-1:2005	NOTE	Approved as HD 60364-1:2008 +A11:2017
IEC 60364-5-56	NOTE	Approved as HD 60364-5-56
IEC 60947-5-1	NOTE	Approved as EN 60947-5-1
IEC 60947-6-2:2020	NOTE	Approved as EN IEC 60947-6-2:2023
IEC 61439 (series)	NOTE	Approved as EN IEC 61439 (series)
IEC 62443 (series)	NOTE	Approved as EN IEC 62443 (series)
IEC/TR 63201	NOTE	Approved as CLC IEC/TR 63201

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cencenelec.eu.

Publication	Year	Title	EN/HD	Year
IEC 60068-2-2	2007	Environmental testing - Part 2-2: Tests - Test B: Dry heat	EN 60068-2-2	2007
IEC 60417	-	Graphical symbols for use on equipment	-	
IEC 60715	2017	Dimensions of low-voltage switchgear and controlgear - Standardized mounting on rails for mechanical support of switchgear, controlgear and accessories	EN 60715	2017
IEC 60812	-	Failure modes and effects analysis (FMEA and FMECA)	EN IEC 60812	2018
IEC 60947	(all parts)	Low-voltage switchgear and controlgear	EN 60947	-[1]
IEC 60947-1	2020	Low-voltage switchgear and controlgear – Part 1: General rules	EN IEC 60947-1	2021
			+ AC	2023-01
IEC 60947-2	2016	Low-voltage switchgear and controlgear – Part 2: Circuit-breakers	EN 60947-2	2017
+ A1	2019		+ A1	2020
IEC 60947-3	2020	Low-voltage switchgear and controlgear - Part 3: switches, disconnectors, switch-disconnectors and fuse-combination units	EN IEC 60947-3	2021
			+ AC	2021-11
IEC 60947-4-1	2018	Low-voltage switchgear and controlgear - Part 4-1: Contactors and motor-starters - Electromechanical contactors and motor-starters	EN IEC 60947-4-1	2019
			+ AC	2020-05
			+ AC	2021-04

[1] Those parts of the EN 60947 series listed in reference are those listed in the rows below.

Publication	Year	Title	EN/HD	Year
IEC 61000-4-13	2002	Electromagnetic compatibility (EMC) – Part 4-13: Testing and measurement techniques – Harmonics and interharmonics including mains signalling at a.c. power port, low-frequency immunity tests	EN 61000-4-13	2002
+ A1	2009		+ A1	2009
+ A2	2015		+ A2	2016
CISPR 11 (mod)	2015	Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement	EN 55011	2016
+ A1	2016		+ A1	2017
			+ A11	2020

Annex ZZA
(informative)

Relationship between this European standard and the safety objectives of Directive 2014/35/EU [2014 OJ L96] aimed to be covered

This European standard has been prepared under a Commission's standardisation request relating to harmonised standards in the field of the Low Voltage Directive, M/511, to provide one voluntary means of conforming to safety objectives of Directive 2014/35/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits [2014 OJ L96].

Once this standard is cited in the Official Journal of the European Union under that Directive, compliance with the normative clauses of this standard given in Table ZZA.1 confers, within the limits of the scope of this standard, a presumption of conformity with the corresponding safety objectives of that Directive, and associated EFTA regulations.

Table ZZA.1 — Correspondence between this European standard and Annex I of Directive 2014/35/EU [2014 OJ L96]

Safety objectives of Directive 2014/35/EU	Clause(s) / sub-clause(s) of this EN	Remarks/note
1 a)	4, 5, 6, 8	
1 b)	5, 6, 7, 8, 9	
1 c)	4, 5, 6, 7, 8, 9, Annex A,	
2 a)	5, 6, 8, 9, Annex A	
2 b)	5, 6, 8, 9	
2 c)	5, 6, 7, 8	
2 d)	5, 6, 8, 9	
3 a)	5, 6, 7, 8, 9	
3 b)	4, 5, 6, 7, 8, 9	
3 c)	5, 6, 8, 9	

WARNING 1 — Presumption of conformity stays valid only as long as a reference to this European standard is maintained in the list published in the Official Journal of the European Union. Users of this standard should consult frequently the latest list published in the Official Journal of the European Union.

WARNING 2 — Other Union legislation may be applicable to the product(s) falling within the scope of this standard.

Annex ZZB
(informative)

Relationship between this European standard and the essential requirements of Directive 2014/30/EU [2014 OJ L96] aimed to be covered

This European standard has been prepared under the European Commission standardisation request C(2016) 7641 final of 30.11.2016[2], ('M/552'), as regards harmonised standards in support of Directive 2014/30/EU relating to electromagnetic compatibility, to provide one voluntary means of conforming to essential requirements of Directive 2014/30/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to electromagnetic compatibility [2014 OJ L96].

Once this standard is cited in the Official Journal of the European Union under that Directive, compliance with the normative clauses of this standard given in Table ZZB.1 confers, within the limits of the scope of this standard, a presumption of conformity with the corresponding essential requirements of that Directive, and associated EFTA regulations.

Table ZZB.1 — Correspondence between this European standard and the Essential Requirements set out in Directive 2014/30/EU [2014 OJ L96]

Essential requirements of Directive 2014/30/EU	Clause(s) / sub-clause(s) of this EN	Remarks / Notes
Annex I. 1(a) (electromagnetic disturbances)	8.3.1, 8.3.3, 9.2.8.1, 9.2.8.3	When this standard in subclauses 8.3.3 and 9.2.8.3 normatively references EN 55011 for emission requirements the following applies: With respect to Clause 3.19 of EN 55011 (Type Test), the following shall not be applied if Clause 6 (Limits of electromagnetic disturbances) is applied for the purposes of the presumption of conformity: 'Note 1 to entry: Recognition of a type test as type approval may depend on national or regional regulation, see H.2 in Annex H.' With respect to Clause 7.1 of EN 55011 (General), the following shall not be applied, if Clause 6 of EN 55011 (Limits of electromagnetic disturbances) is applied for the purposes of the presumption of conformity: 'Requirements which relate to measurements at such test sites are type test requirements. A type test may be recognized as type approval if the conditions for the statistical

[2] COMMISSION IMPLEMENTING DECISION C(2016) 7641 final of 30.11.2016 on a standardisation request to the European Committee for Standardisation, to the European Committee for Electrotechnical Standardisation and to the European Telecommunications Standards Institute as regards harmonised standards in support of Directive 2014/30/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to electromagnetic compatibility.

		assessment of measurement results according to Annex H are observed.' With respect to Clause 3.19 of EN 55011 (Type Test), the following shall not be applied, if Clause 7 of EN 55011 (Measurement requirements) is applied for the purposes of the presumption of conformity: 'Note 1 to entry: Recognition of a type test as type approval may depend on national or regional regulation, see H.2 in Annex H.' With respect to Clause 7.1 of EN 55011 (General), the following shall not be applied, if Clause 7 of EN 55011 (Measurement requirements) is applied for the purposes of the presumption of conformity: 'Requirements which relate to measurements at such test sites are type test requirements. A type test may be recognized as type approval if the conditions for the statistical assessment of measurement results according to Annex H are observed.'
Annex I. 1(b) (electromagnetic immunity)	8.3.1, 8.3.2, 9.2.8.1, 9.2.8.2	

WARNING 1 — Presumption of conformity stays valid only as long as a reference to this European standard is maintained in the list published in the Official Journal of the European Union. Users of this standard should consult frequently the latest list published in the Official Journal of the European Union.

WARNING 2 — Other Union legislation may be applicable to the product(s) falling within the scope of this standard.

IEC 60947-6-1

Edition 3.0 2021-03

INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Low-voltage switchgear and controlgear – Part 6-1: Multiple function equipment – Transfer switching equipment

Appareillage à basse tension – Partie 6-1: Matériels à fonctions multiples – Equipement de transfert de source

INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMISSION ELECTROTECHNIQUE INTERNATIONALE

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR –

Part 6-1: Multiple function equipment – Transfer switching equipment

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 60947-6-1 has been prepared by sub-committee 121A: Low-voltage switchgear and controlgear, of IEC technical committee 121: Switchgear and controlgear and their assemblies for low voltage.

This third edition cancels and replaces the second edition published in 2005, and its Amendment 1:2013. This edition constitutes a technical revision.

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

– clarification of scope and object;
– clarification of terms and definitions;
– removal of unnecessary definitions;
– modification of characteristics;

- modification of utilization categories definitions;
- introduction of new markings requirements;
- addition of new requirements for clearances and creepage distances;
- addition of new requirements and tests for mechanical and electrical interlocks;
- clarification of transfer sequences;
- modification of requirements for rated short-time withstand currents;
- modification of new requirements for electromagnetic compatibility;
- clarification of performance requirements for CB type TSE, in alignment with requirements stated in IEC 60947-2;
- addition of new test sequence V: Critical load current performance of equipment with DC ratings.

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

FDIS	Report on voting
121A/403/FDIS	121A/411/RVD

Full information on the voting for the approval of this document 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.

A list of all the parts in the IEC 60947 series, published under the general title *Low-voltage switchgear and controlgear*, can be found on the IEC website.

This document shall be read in conjunction with IEC 60947-1:2020, *Low voltage switchgear and controlgear – Part 1: General rules*.

The provisions of the general rules are applicable to IEC 60947-1 where specifically called for. General rules clauses and subclauses thus applicable as well as tables, figures and appendices are identified by reference to IEC 60947-1:2020, for example, 1.2.3, Table 4, or Annex A of IEC 60947-1:2020.The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC website 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.

IMPORTANT – The "colour inside" logo on the cover page of this document indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

The availability of power in low voltage electrical installations is playing an ever increasing role in modern society. In actual fact, this requirement is a fundamental characteristic for the creation of economically and functionally efficient installations. A system able to switch a load from one source to another safely and with minimum disturbance to the load reduces problems caused by faulty conditions in the normal supply to the minimum.

All these operations, commonly known as “transfer switching”, control the installations and can be done automatically, remotely or manually.

Therefore, an installation with installed “transfer switching” capability:

– ensures the continuity of production processes;
– provides a backup source of power if the main network is out of service;
– reduces the effect caused by network faults on parts of the installation;
– achieves a good compromise between reliability, simplicity and cost-effectiveness;
– provides the facility manager and managing system with a power source able to supply all or part of the installation.

Key factors motivating customers to use Transfer Switch Equipment (TSE) include:

– the continuous world growth population, the increasing number of electronic devices and the new demands of electric vehicles;
– the mediated pressure on climate change with a resulting increase in the cost of energy;
– the evolution of the electricity market with a greater number of alternate energy sources;
– the user’s expectations of better grid reliability, better economic performance, and a desire to manage their energy.

Stakeholders involved in the management of electricity also have new expectations:

– customers want to reduce the cost of their energy and to have a quality energy supply;
– suppliers want to reinforce confidence to their customers;
– producers expect to optimize their investments;
– governments and regulators are willing to create a competitive and sustainable energy market.

Today, the performance of Transfer Switching Equipment is defined by TSE manufacturers and also by this document. Consultants, integrators, facility managers and end users rely on this document for their power availability needs.

Transfer switching are often realised by implementing a transfer function within the electrical installation, but this critical function can be inappropriately designed. Using a TSE following the requirements of this document ensures the safety and the performance of the transfer function which are necessary for reaching the objectives listed above.

LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR –

Part 6-1: Multiple function equipment – Transfer switching equipment

1 Scope

This document applies to transfer switching equipment (TSE), to be used in power systems for ensuring the continuity of the supply and allowing the energy management of the installation, by transferring a load between power supply sources, the rated voltage of which does not exceed 1 000 V AC or 1 500 V DC.

It covers:

– manually operated transfer switching equipment (MTSE);

– remotely operated transfer switching equipment (RTSE);

– automatic transfer switching equipment (ATSE), including the controller.

It does not cover:

1) TSE configurations that are either not manufacturer tested and/or not marked according to this document as a complete transfer switch;
2) auxiliary contacts (for guidance, see IEC 60947-5-1);
3) transfer switches used in explosive atmospheres (for guidance, see IEC 60079 (all parts));
4) embedded software design (for guidance, see IEC TR 63201);
5) cybersecurity aspects (for guidance, see IEC TS 63208);
6) TSE rated for direct-on-line starting asynchronous motor of design NE and HE, according to IEC 60034-12:2016 (for guidance, see AC-3e utilisation category according IEC 60947-4-1:2018);
7) other types of TSE under consideration including closed transition TSE, overlapping neutral TSE, multi-source TSE (i.e. TSE with more than two sources of supply), stand-alone ATS controllers, bypass isolation TSE, TSE with load-shedding functions and bus-tie TSE.

NOTE TSE used for safety services and for emergency escape lighting systems as described in IEC 60364-5-56 are subject to specific rules and/or legal requirements.

The object of this document is to state:

1) the characteristics of the equipment;
2) the conditions of the equipment with respect to:
   a) operation for which the equipment is intended;
   b) operation and behaviour in case of specified abnormal conditions, for example, short-circuit;
   c) dielectric properties;
3) the tests intended to confirm that these conditions have been met and the methods for performing these tests;
4) the product information to be provided by the manufacturer.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60068-2-2:2007, *Environmental testing – Part 2-2: Tests – Test B: Dry heat*

IEC 60417, *Graphical symbols for use on equipment* (available at http://www.graphical-symbols.info/equipment)

IEC 60715:2017, *Dimensions of low-voltage switchgear and controlgear – Standardized mounting on rails for mechanical support of switchgear, controlgear and accessories*

IEC 60812, *Failure modes and effects analysis (FMEA and FMECA)*

IEC 60947 (all parts), *Low-voltage switchgear and controlgear*

IEC 60947-1:2020, *Low-voltage switchgear and controlgear – Part 1: General rules*

IEC 60947-2:2016, *Low-voltage switchgear and controlgear – Part 2: Circuit-breakers*
IEC 60947-2:2016/AMD1:2019

IEC 60947-3:2020, *Low-voltage switchgear and controlgear – Part 3: Switches, disconnectors, switch-disconnectors and fuse-combination units*

IEC 60947-4-1:2018, *Low-voltage switchgear and controlgear – Part 4-1: Contactors and motor-starters – Electromechanical contactors and motor-starters*

IEC 61000-4-13:2002, *Electromagnetic compatibility (EMC) – Part 4-13: Testing and measurement techniques – Harmonics and interharmonics including mains signalling at a.c. power port, low frequency immunity tests*
IEC 61000-4-13:2002/AMD1:2009
IEC 61000-4-13:2002/AMD2:2015

CISPR 11:2015, *Industrial, scientific and medical equipment – Radio-frequency disturbance characteristics – Limits and methods of measurement*
CISPR 11:2015/AMD1:2016