

*Incorporating
Amendments Nos. 1
and 2, implementing
Amendment No. 3, not
published separately,
and incorporating
Amendment No. 4*

Specification for

Low-voltage switchgear and controlgear

Part 6. Multiple function equipment

**Section 1. Automatic transfer switching
equipment**

The European Standard EN 60947-6-1 : 1991 with the incorporation of amendments A1 : 1994, A11 : 1997 and A2 : 1997 has the status of a British Standard

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Cooperating organizations

The European Committee for Electrotechnical Standardization (CENELEC), under whose supervision this European Standard was prepared, comprises the national committees of the following countries.

Austria	Italy
Belgium	Luxembourg
Denmark	Netherlands
Finland	Norway
France	Portugal
Germany	Spain
Greece	Sweden
Iceland	Switzerland
Ireland	United Kingdom

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Documents

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National foreword

This British Standard has been prepared under the direction of the Power Electrical Engineering Standards Policy Committee and is the English language version of EN 60947-6-1 'Low-voltage switchgear and controlgear' Part 6 'Multiple function equipment' Section One 'Automatic transfer switching equipment', published by the European Committee for Electrotechnical Standardization (CENELEC) including amendments A1 and A11, the corrigendum dated June 1997 and amendment A2 : 1997. It was derived by CENELEC from IEC 947-6-1 : 1989, its corrigendum November 1991 and amendment No. 2 : 1997, published by the International Electrotechnical Commission (IEC).

NOTE. CENELEC amendment A2 : 1997 supersedes CENELEC amendment A11 : 1997.

The CENELEC changes included in the introduction of the European Standard have been implemented at the appropriate places in the text and are indicated by a double side line in the margin. Parts of the original IEC text that have been modified by CENELEC have been quoted in national annex NA.

This British Standard is to be read in conjunction with BS EN 60947-1 which identifies the general requirements for equipment for low-voltage switchgear and controlgear. The BS EN 60947 series comprises the following publications.

Part 1	General rules
Part 2	Circuit breakers
Part 3	Switches, disconnectors, switch-disconnectors and fuse-combination units
Part 4	Contactors and motor-starters Section 1 Electromechanical contactors and motor-starters
Part 5	Control circuit devices and switching elements Section 1 Electromechanical control circuit devices Section 2 Proximity switches
Part 6	Multiple function equipment Section 1 Automatic transfer switching equipment
Part 7	Ancillary equipment Section 1 Terminal blocks and copper conductors

The foreword of the EN makes reference to 'date of withdrawal (dow) of conflicting national standards' as 1995-10-01. In this case the relevant national standard is BS EN 60947-6-1 but the date of withdrawal relates only to those parts of the British Standard subject to Amendment 2. Certificates and marks will not be awarded after this date with respect to the British Standard not incorporating Amendment 2. They will be awarded only to the amended British Standard. However, such certificates and marks already awarded with respect to the British Standard not incorporating Amendment 2 may continue to apply for production until 2000-10-01.

Analogous provisions apply in respect of Amendment No. 3, for which the dow is 1997-10-01 and amendment No. 4 for which the dow is 1998-07-01.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Descriptors: Low-voltage switchgear, multiple function equipment, switching, automatic transfer

English version

Low-voltage switchgear and controlgear Part 6: Multiple function equipment Section one — Automatic transfer switching equipment

(includes amendments A1 : 1994, A11 : 1997 and A2 : 1997)

(IEC 947-6-1 : 1989 + A1 : 1994 + A2 : 1997, modified)

Appareillage à basse tension

Sixième partie: Matériaux à fonctions multiples

Section un — Matériels de connexion de transfert automatique

(inclut les amendements A1 : 1994,
A11 : 1997 et A2 : 1997)

(CEI 947-6-1 : 1989 + A1 : 1994
+ A2 : 1997, modifiée)

Niederspannung-Schaltgeräte

Teil 6: Mehrfunktion Schaltgeräte

Hauptabschnitt eins — Automatischer
Netzumschalter

(enthält Änderungen A1 : 1994,
A11 : 1997 und A2 : 1997)

(IEC 947-6-1 : 1989 + A1 : 1994
+ A2 : 1997, modifiziert)

This European Standard was approved by CENELEC on 1991-03-15. 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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

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

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Foreword

The CENELEC questionnaire procedure, performed for finding out whether or not the International Standard IEC 947-6-1 : 1989 could be accepted without textual changes, has shown that no CENELEC common modifications were necessary for the acceptance as European Standard. The reference document was submitted to the CENELEC members for formal vote and was approved by CENELEC as EN 60947-6-1 on 15 March 1991.

The following dates were fixed:

- latest date of publication of an identical national standard (dop) 1992-03-01
- latest date of withdrawal of conflicting national standards (dow) 1997-10-01

Annexes designated 'normative' are part of the body of the standard. In this standard, annex ZA is normative.

For products which have complied with the relevant national standard before 1992-03-01, as shown by the manufacturer or by a certification body, this previous standard may continue to apply for production until 1997-03-01.

Foreword to amendment A1

The text of document 17B(CO)225, as prepared by Subcommittee 17B: Low-voltage switchgear and controlgear, of IEC Technical Committee 17: Switchgear and controlgear, was submitted to the IEC-CENELEC parallel vote in March 1994.

The reference document was approved by CENELEC as amendment A1 to EN 60947-6-1 on 4 October 1994.

The following dates were fixed:

- latest date of publication of an identical national standard (dop) 1995-10-01
- latest date of withdrawal of conflicting national standards (dow) 1997-10-01

For products which have complied with EN 60947-6-1 : 1991 before 1995-10-01, as shown by the manufacturer or by a certification body, this previous standard may continue to apply for production until 2000-10-01.

Foreword to amendment A11

This amendment was prepared by the Technical Committee CENELEC TC 17B, Low-voltage switchgear and controlgear including dimensional standardization.

The text of the draft was submitted to the Unique Acceptance Procedure and was approved by CENELEC as amendment A11 to EN 60947-6-1 : 1991 on 1996-07-02.

The following dates were fixed:

- latest date by which the amendment has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 1997-10-01
- latest date by which the national standards conflicting with the amendment have to be withdrawn (dow) 1997-10-01

This amendment covers the requirements of EMC for automatic transfer switching equipment. It contains additional requirements corresponding to subclause 7.3 of EN 60947-1.

Introduction

All subjects left 'under consideration' in IEC 947-6-1 : 1989 are not part of this European Standard.

This means that:

- for the following clauses the title and text are to be replaced by 'Vacant':

8.1.4 Sampling tests

- in the following clauses the appropriate paragraphs or notes are to be deleted:

7.1 Constructional requirements

7.2.6 Switching overvoltages

8.3.3.5.4 Switching overvoltages

Up-to-date information concerning the subjects dealt with in these clauses can be obtained from the secretariat of CENELEC TC 17B.

Foreword to amendment A2

The text of document 17B/812/FDIS, future amendment 2 to IEC 60947-6-1 : 1989, prepared by SC 17B, Low-voltage switchgear and controlgear, of IEC TC 17, Switchgear and controlgear, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as amendment A2 to EN 60947-6-1 : 1991 on 1997-10-01.

This amendment supersedes EN 60947-6-1 : 1991/A11 : 1997.

The following dates were fixed:

- latest date by which the amendment has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 1998-07-01
- latest date by which the national standards conflicting with the amendment have to be withdrawn (dow) 1998-07-01

Annexes designated 'normative' are part of the body of the standard. In this standard, annex ZA is normative. Annex ZA has been added by CENELEC.



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LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR
Part 6: Multiple function equipment
Section One - Automatic transfer switching equipment

1. General

The provisions of the General Rules, IEC Publication 947-1, are applicable to this standard, where specifically called for. General Rules clauses and sub-clauses thus applicable, as well as tables, figures and appendices are identified by references to Part 1, for example: "Sub-clause 1.2.3, Table IV or Appendix A or Part 1".

1.1 Scope

This standard applies to Automatic Transfer Switching Equipment (ATSE) to be used in emergency power systems with interruption of the supply to the load during transfer, the rated voltage of which does not exceed 1 000 V a.c. or 1 500 V d.c. It covers ATSE provided with or without an enclosure.

Devices necessary for the control (e.g. control switches, ...) and the protection (e.g. circuit-breakers, ...) of an ATSE shall comply with the requirements of the relevant IEC standards.

ATSE used only for emergency lighting may be subject to specific rules and/or legal requirements and are not, therefore, covered by this standard.

1.2 Object

The object of this standard is to state:

- 1) the characteristics of the equipment.
- 2) the conditions with which the equipment must comply with reference 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 data to be marked on the equipment and provided by the manufacturer.

2. Definitions

For the purpose of this standard the relevant definitions given in Clause 2 of Part 1 and the following additional definitions shall apply:

2.1 *Switching devices*

2.1.1 *Transfer switching device (transfer switch)*

A device for transferring one or more load circuits from one supply to another.

2.1.2 *Automatic transfer switching equipment (ATSE)*

Self-acting equipment containing the transfer switching device(s) and other necessary devices for monitoring supply circuits and for transferring one or more load circuits from one supply to another.

2.2 *Operation of ATSE*

2.2.1 *Operating sequence*

The operating sequence of ATSE consists of an automatic transfer of a load from the normal supply to an alternative supply in the event of a monitored supply deviation and automatically returning the load to the normal supply when it is restored. The transfer may be with or without a predetermined time delay and may include an off position.

In the case of both the normal and the alternative supplies being present, the ATSE shall assume the normal supply position.

2.2.2 *Monitored supply deviation*

A variation in the power supply characteristics being monitored so that it signals the ATSE to operate when a deviation from the specified limits occurs, for example, abnormal changes in voltage or frequency of the supply.

2.2.2.1 *Voltage supply deviation*

The change or loss of voltage of the normal power supply.

2.2.2.2 *Frequency supply deviation*

The change in frequency from the normal operating frequency of the normal supply.

2.2.3 *Operating times*

2.2.3.1 *Contact transfer time*

The time measured from the parting of one set of main contacts from one power supply to the closing of a second set of main contacts on an alternative power supply.

2.2.3.2 *Operating transfer time*

The time measured from the instant of the monitored supply deviation to the closing of main contacts on an available alternative supply source, exclusive of any purposely introduced time delay.

2.2.3.3 *Total operating time*

The sum of operating transfer time and any purposely introduced time delay.

2.2.3.4 *Return transfer time*

The time from the instant when the normal supply is fully restored to the instant when the set of main contacts is closed on the normal supply, plus any purposely introduced time delay.

2.2.3.5 *Off-time*

The time measured during transfer from the instant of final arc extinction in all poles to the closing of main contacts on another supply, including any purposely introduced time delay.

2.3 *Main contact positions*

2.3.1 *Normal position*

The contact position of the equipment when there is no deviation of the normal supply.

2.3.2 *Alternative position*

The contact position of the equipment when the load circuit is switched on the alternative (emergency) supply in the event of a monitored supply deviation of the normal supply.

2.3.3 *Off position*

The contact position of the equipment when the load circuit is not switched on any supply.

Note.- This position results from either automatic tripping caused by a fault in the load circuit or intentional interruption of the automatic transfer function.

3. *Classification*

Automatic transfer switching equipment is classified as Class PC or Class CB.

Class PC: ATSE that is capable of making and withstanding, but is not intended for breaking short-circuit currents.

Class CB : ATSE provided with overcurrent releases and the main contacts of which are capable of making and are intended for breaking short-circuit currents.

4. Characteristics

4.1 *Summary of characteristics*

Wherever practicable the characteristics of the ATSE shall be stated as follows:

- Type of equipment (Sub-clause 4.2).
- Rated and limiting values for the main circuit (Sub-clause 4.3).
- Utilization category (Sub-clause 4.4).
- Control circuits (Sub-clause 4.5).
- Auxiliary circuits (Sub-clause 4.6).
- Switching overvoltages (Sub-clause 4.9).

4.2 *Type of equipment*

The following shall be stated:

- class of equipment;
- number of poles;
- kind of current;
- operating sequence.

4.3 *Rated and limiting values for the main circuit*

Sub-clause 4.3 of Part 1 applies. However, minimum values for Sub-clauses 4.3.6.1, 4.3.6.3 and 4.3.6.4 are given in Table IV.

4.3.1 *Rated voltages*

4.3.1.1 *Rated operational voltage (U_e)*

Sub-clause 4.3.1.1 of Part 1 applies.

4.3.1.2 *Rated insulation voltage (U_i)*

Sub-clause 4.3.1.2 of Part 1 applies.

4.3.1.3 *Rated impulse withstand voltage (U_{imp})*

Sub-clause 4.3.1.3 of Part 1 applies.

4.3.2 *Rated operational current (I_e)*

The rated operational current of ATSE is the rated uninterrupted current (I_u). See Sub-clause 4.3.2.4 of Part 1.

4.3.3 *Rated frequency*

Sub-clause 4.3.3 of Part 1 applies.

4.3.4 *Uninterrupted duty*

Sub-clause 4.3.4.2 of Part 1 applies.

4.3.5 *Rated making and breaking capacities*

The rated making and breaking capacities are the values of current, stated by the manufacturer, which the transfer equipment can satisfactorily make and break under specified conditions. Unless stated otherwise, they are given in terms of a steady state current value. During the making operation, the peak value of the current on contact closing may be higher than the peak value of the steady state current depending on the characteristics of the test circuit (load) and the instant of closing on the voltage wave.

The rated making and breaking capacities are stated with reference to the rated operational voltage, the rated operational current and the utilization category according to Table II.

For a.c., the rated making and breaking capacities are expressed by the r.m.s. value of the a.c. component of the current.

4.3.6 *Short-circuit characteristics*

4.3.6.1 *Rated short-time withstand current (I_{cw})*

The rated short-time withstand current is the value of short-time withstand current stated by the manufacturer which the equipment can carry under the test conditions specified in Sub-clause 8.3.4.3.

For a.c., the value of the current is the r.m.s. value of the a.c. component and the highest peak value in any one phase shall be not less than n times this r.m.s. value, the ratio n being given in Table XVI of Part 1.

The minimum value of the short-time withstand current is given in column 2 of Table IV.

Note.- Additional lower values of short-time withstand current for longer durations may be stated by the manufacturer.

The minimum durations are:

- 3 half-cycles of the rated frequency or 0,025 s for d.c. for rated operational currents up to and including 400 A;
- 3 cycles of the rated frequency or 0,05 s for d.c. for rated operational currents higher than 400 A.

4.3.6.2 *Rated short-circuit making capacity (I_{cm})*

The rated short-circuit making capacity is the value of short-circuit making capacity assigned by the manufacturer for the rated operational voltage at rated frequency and at a specified power-factor (or time-constant). It is expressed as the maximum prospective peak current.