IEC 60884-2-4

Edition 3.0 2007-11

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Plugs and socket-outlets for household and similar purposes – Part 2-4: Particular requirements for plugs and socket-outlets for SELV

Prises de courant pour usages domestiques et analogues – Partie 2-4: Règles particulières pour prises de courant pour TBTS

IEC 60884-2-4:2007

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Prises de courant pour usages domestiques et analogues – Partie 2-4: Règles particulières pour prises de courant pour TBTS

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

PLUGS AND SOCKET-OUTLETS FOR HOUSEHOLD AND SIMILAR PURPOSES –

Part 2-4: Particular requirements for plugs and socket-outlets for SELV

FOREWORD

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International Standard IEC 60884-2-4 has been prepared by subcommittee 23B: Plugs, socket-outlets and switches, of IEC technical committee 23: Electrical accessories.

This third edition cancels and replaces the second edition published in 1999. It constitutes a technical revision. The main changes from the previous edition are as follows:

Clause 7 – Classification:

– deletion of classification according to the degree of protection against harmful ingress of water;
– inapplicability of 7.1.3 of Part 1 concerning classification according to the provision for earthing:
– inapplicability of 7.2.2 of Part 1 concerning classification according to the existence of shutters.

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Clause 8 – Marking:

– modification of the symbol for degree of protection to IPXX (Subclause 8.2).

Clause 9 – Checking of dimensions:

– addition of compliance paragraph in 9.1.

Clause 13 – Construction of fixed socket-outlets:

– applicability of 13.14 of Part 1;
– addition of requirement about multiple socket-outlets (Subclause 13.101).

Clause 14 – Construction of plugs and portable socket-outlets:

– modification of compliance paragraph of 14.23;
– addition of requirement about minimum nominal cross-sectional area of cables for cord extension sets (Subclause 14.101).

Clause 16 – Resistance to ageing, protection provided by the enclosures, and resistance to humidity:

– applicability of the whole Clause of Part 1.

Clause 21 – Normal operation:

– addition of maximum specified dimensions, including tolerance, of the test plug.

Figures:

– new figures for gauges for the verification of maximum and minimum withdrawal force.

Annexes:

– deletion of informative Annex AA and inclusion of the relevant information in normative Annex B.

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

CDV	Report on voting
23B/836/CDV	23B/858/RVC

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 Part 2-4 is intended to be used in conjunction with IEC 60884-1 and IEC 60906-3. It was established on the basis of the third edition of IEC 60884-1 (2002) and of its Amendment 1 (2006).

This Part 2-4 supplements or modifies the corresponding clauses in IEC 60884-1, so as to convert that publication into the IEC standard: Particular requirements for plugs and socket-outlets for SELV.

When a particular subclause of Part 1 is mentioned in this Part 2-4, that subclause applies as far as reasonable. Where this standard states “addition”, “modification” or “replacement”, the relevant text of Part 1 is to be adapted accordingly.

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In this standard the following print types are used:

– requirements proper: in roman type;

– *test specification: in italic type;*

– explanatory notes: in small roman type.

Subclauses or figures which are additional to those in Part 1 are numbered starting from 101; supplementary annexes are entitled AA, BB, etc.

When clauses of Part 1 are declared as applicable, they apply only where they contain requirements concerning plugs and socket-outlets for SELV.

A list of all parts of the IEC 60884 series, under the general title: *Plugs and socket-outlets for household and similar purposes*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result 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.

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PLUGS AND SOCKET-OUTLETS FOR HOUSEHOLD AND SIMILAR PURPOSES –

Part 2-4: Particular requirements for plugs and socket-outlets for SELV

1 Scope

Replacement:

This Part 2-4 of IEC 60884 applies to plugs, fixed or portable socket-outlets, and to socket-outlets for appliances from 6 V up to and including 48 V d.c. or a.c. (50/60 Hz) SELV with rated current of 16 A, intended for household and similar purposes, either indoors or outdoors.

NOTE 1 The extension of this standard to higher frequencies is under consideration.

This standard does not cover requirements for flush mounting boxes; it covers only those requirements for surface-type mounting boxes which are necessary for the tests on the socket-outlet.

This standard also applies to plugs and socket-outlets incorporated in cord extension sets or integrated in or incorporated in appliances or intended to be fixed to them.

NOTE 2 A socket-outlet integrated in an appliance or equipment is a socket-outlet which is formed by the housing of the appliance or equipment.

A socket-outlet incorporated in an appliance or equipment is a separate socket-outlet built in or fixed to an appliance or equipment.

In addition, socket-outlets for appliances or equipment must comply with IEC 60884-2-2.

This standard does not apply to

– plugs, socket-outlets and couplers for industrial purposes;
– appliance couplers;
– fixed socket-outlets combined with fuses, automatic switches, etc.

Plugs and fixed or portable socket-outlets complying with this standard are suitable for use at ambient temperatures not normally exceeding 25 °C, but occasionally reaching 35 °C.

NOTE 3 Socket-outlets complying with this standard are only suitable for incorporation in equipment in such a way and in such a place that it is unlikely that the surrounding temperature exceeds 35 °C.

In locations where special conditions prevail, such as in ships, vehicles and the like, and in hazardous locations, for example where explosions are liable to occur, special constructions may be required.

2 Normative references

This clause of Part 1 is applicable except as follows:

Addition:

IEC 60884-2-2, *Plugs and socket-outlets for household and similar purposes – Part 2: Particular requirements for socket-outlets for appliances*

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IEC 60906-3:1994, *IEC system of plugs and socket-outlets for household and similar purposes – Part 3: SELV plugs and socket-outlets, 16 A 6 V, 12 V, 24 V, 48 V, a.c. and d.c.*

ISO 1302:2002, *Geometrical Product Specifications (GPS) – Indication of surface texture in technical product documentation*

3 Definitions

This clause of Part 1 is applicable, except as follows:

Addition:

3.101
SELV
voltage which does not exceed 50 V a.c. r.m.s. or 120 V d.c. (ripple free) between conductors, or between any conductor and earth, in a circuit which is isolated from the supply mains by means such as a safety isolating transformer or converter with separate windings

NOTE The rated voltages of the systems considered by this standard do not exceed 48 V a.c. and 48 V d.c.

4 General requirements

This clause of Part 1 is applicable.

5 General remarks on tests

This clause of Part 1 is applicable, except as follows:

5.4 *Addition after the first paragraph:*

When a manufacturer's design is used for d.c., as well as for a.c., three additional specimens are required for the tests of Clauses 19, 20 and 21.

When a manufacturer's design is used for two or more voltages, three additional specimens are required for each additional voltage.

All relevant tests are carried out with the specimens having the highest rated voltage(s).

In addition, compliance with the dimensions of standard sheets 1 to 6 of IEC 60906-3 is checked on one specimen of each type.

NOTE A table showing the specimens required for the tests is given in Annex B.

6 Ratings

This clause of Part 1 is applicable, except as follows:

6.1 *Replacement:*

Accessories shall be of the type and have voltage and current rating as shown in Table 1.

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Table 1 – Ratings

Type	Rated voltage V		Rated current A
2P (rewirable or non-rewirable)	AC	6[a], 12, 24, 48	16
	DC	6[a], 12, 24, 48	
[a] Non-preferred values.			

6.2 This subclause of Part 1 is not applicable.

7 Classification

This clause of Part 1 is applicable, except as follows:

7.1.3 This subclause is not applicable.

7.2.1 This subclause is not applicable.

7.2.2 This subclause is not applicable.

7.2.5 This subclause is not applicable.

7.3 *Replacement:*

Plugs are classified according to the class of equipment to which they are intended to be connected:

– plugs for equipment of class III.

NOTE For the description of the classes of equipment, see IEC 61140.

8 Marking

This clause of Part 1 is applicable except as follows:

8.1 *Addition:*

In addition, the terminals of d.c. accessories shall be marked with symbols.

8.2 *Replacement*:

When symbols are used, they shall be as follows:

Amperes ..... A

Volts V

Alternating current..... ~

Direct current ..... ⎓

Positive pole ..... +

Negative pole ..... –

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Degree of protection, when relevant ..... IPXX

NOTE 1 Details of construction of symbols are given in IEC 60417 (IEC 60417, *Graphical symbols for use on equipment*).

NOTE 2 In the IP code, the letter "X" is replaced by the relevant number.

NOTE 3 Lines formed by the construction of the tool are not considered as part of the marking.

For the marking of rated current and rated voltage, the figures may be used alone. These figures may be placed on one line separated by an oblique line or the figure for rated current may be placed above the figure for rated voltage, separated by a horizontal line.

The marking for the nature of supply shall be placed next to the marking for rated current and rated voltage.

NOTE 4 The marking for current, voltage and nature of supply may be, for instance, as follows:

16 A 48 V ~ or 16/48 ~ or $\frac{16}{48}$ ~

16 A 12 V ⎓ or 16/12 ⎓ or $\frac{16}{12}$ ⎓

8.4 *Deletion of the second paragraph.*

8.5 *Replacement:*

Terminals for d.c. accessories shall be indicated by the symbols + and –.

These markings shall not be placed on screws, or any other easily removable parts.

NOTE 1 "Easily removable parts" are those parts which can be removed during the normal installation of the socket-outlet or the assembly of the plug.

NOTE 2 Terminations in non-rewirable accessories need not be marked.

9 Checking of dimensions

This clause of Part 1 is applicable, except as follows:

9.1 *Replacement:*

Accessories shall comply with the relevant standard sheets 1 to 6 of IEC 60906-3, as applicable.

Compliance is checked by inspection.

9.2 *Replacement of all the paragraphs before the compliance by:*

It shall not be possible for

– d.c. plugs to enter a.c. socket-outlets, nor a.c. plugs to enter d.c. socket-outlets;
– plugs to enter socket-outlets of any other plug and socket-outlet system;
– plugs to be able to enter socket-outlets of other voltage ratings.

10 Protection against electric shock

This clause of Part 1 is applicable, except as follows:

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10.2 *Replacement of words* "given in 10.2.1 or 10.2.2 are fulfilled" *by* "given in 10.2.1 are fulfilled."

10.2.2 This subclause is not applicable.

10.3 This subclause is not applicable.

10.4 This subclause is not applicable.

10.5 This subclause is not applicable.

10.6 This subclause is not applicable.

10.7 This subclause is not applicable.

11 Provision for earthing

This clause of Part 1 is not applicable.

12 Terminals and terminations

This clause of Part 1 is applicable, except as follows:

12.2.1 *Replacement of Table 3 by the following new table:*

Table 3 – Relationship between rated current and connectable nominal cross-sectional areas of copper conductors

Current and type of the accessory	Rigid (solid or stranded) copper conductors		Flexible copper conductors	
	Nominal cross-sectional area mm^2	Diameter of the largest conductor mm	Nominal cross-sectional area mm^2	Diameter of the largest conductor mm
16 A 2P (fixed accessory)	From 1,5 up to 2 × 2,5 inclusive	2,13	From 1,5 up to 2 × 2,5 inclusive	2,21
16 A 2P (portable accessory)	–	–	From 0,75 up to 1,5 inclusive	1,73

12.2.10 This subclause is not applicable.

12.3.12 *Replacement of Table 11 by the following new table:*

Table 11 – Nominal cross-sectional areas of rigid copper conductors for the deflection test of screwless terminals

Rated current of the socket-outlet A	Nominal cross-sectional area of the test conductor mm^2	
	First test sequence	Second test sequence
16	1,5	2,5

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13 Construction of fixed socket-outlets

This clause of Part 1 is applicable, except as follows:

13.7.2 *Replacement of the last item of the third dashed text by:*

- live parts of SELV circuits not greater than 25 V a.c. or 60 V d.c.

13.8 This subclause is not applicable.

13.17 This subclause is not applicable.

13.18 This subclause is not applicable.

13.19 This subclause is not applicable.

Addition:

13.101 Multiple socket-outlets shall consist only of SELV socket-outlets.

Compliance is checked by inspection.

14 Construction of plugs and portable socket-outlets

This clause of Part 1 is applicable, except as follows:

14.3 *Deletion of the second paragraph.*

14.4 This subclause is not applicable.

14.7 *Deletion of the last dashed text.*

14.8 This subclause is not applicable.

14.9 This subclause is not applicable.

14.10.1 *Deletion of the fourth paragraph.*

14.10.2 *Deletion of the fourth paragraph.*

14.11 *Deletion of the last dashed text.*

14.15 *Deletion of the note.*

14.21 This subclause is not applicable.

14.23 *Deletion of the second paragraph.*

Replacement of the last paragraph by:

Compliance is checked by the tests of 14.23.1 and 14.23.2.

Deletion of Note 2.

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Addition:

14.101 For cord extension sets, the minimum nominal cross-sectional area of cables is

– 1,0 mm^2 up to and including 2 m length;
– 1,5 mm^2 over 2 m length.

15 Interlocked socket-outlets

This clause of Part 1 is not applicable.

16 Resistance to ageing, protection provided by the enclosures, and resistance to humidity

This clause of Part 1 is applicable.

17 Insulation resistance and electric strength

This clause of Part 1 is applicable, except as follows:

17.1.1 *Deletion of item d) and of the last five words of the second paragraph, i.e. "earthing terminals or earthing contacts".*

17.1.2 *Deletion of item c), and in the last paragraph, the words "earthing terminals" and "earthing contacts".*

17.2 *Replacement of the second paragraph by:*

The test voltage shall be 500 V.

18 Operation of earthing contacts

This clause of Part 1 is not applicable.

19 Temperature rise

This clause of Part 1 is applicable, except as follows:

Deletion of the fourth paragraph from the end of the testing specification (starting with "For accessories having three poles").

20 Breaking capacity

This clause of Part 1 is applicable, except as follows:

Deletion of Notes 2 and 3.

Replacement of the text, from the sixth paragraph of the testing specification to the end inclusive, by the following:

The length of the stroke of the test apparatus is between 50 mm and 60 mm.

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The plug is inserted and withdrawn from the socket-outlet 50 times (100 strokes) at a rate of

– *30 strokes per minute.*

NOTE A stroke is an insertion or withdrawal of the plug.

The test voltage is 53 V and the test current 20 A.

The periods during which the test current is passed from the insertion of the plug until the subsequent withdrawal is $(1{,}5^{+0{,}5}_{0})$ *s.*

Accessories for a.c. are tested using an alternating current (cos φ *= 0,6 ± 0,05).*

Accessories for d.c. are tested in a substantially non-inductive circuit.

The test is made with the connections shown in Figure 17.

With regard to a.c., test resistors and inductors are not connected in parallel, except that, if an air-core inductor is used, a resistor taking approximately 1 % of the current through the inductor is connected in parallel with it. Iron-core inductors may be used, provided the current has a substantially sine-wave form.

Accessible metal parts, metal supports, and any metal frame supporting the base of flush-type socket-outlets are connected through the selector switch C to one of the poles of the supply for half the number of strokes, and to the other pole for the remainder.

In the case of multiple socket-outlets, the test is carried out individually on each socket-outlet.

During the test, no sustained arcing shall occur.

After the test, the specimens shall show no damage impairing their further use and the entry holes for the pins shall not show any damage which may impair the safety within the meaning of this standard.

21 Normal operation

Replacement:

Accessories shall withstand the mechanical, electrical, and thermal stresses occurring in normal use without undue wear or other harmful effect.

Compliance is checked by testing socket-outlets, and plugs with pins which are not solid, by means of an appropriate test apparatus, an example of which is shown in Figure 16.

The test pins shall be replaced after 2 500 strokes.

Socket-outlets are tested using a test plug with brass pins having the maximum specified dimensions, with a tolerance of $^{0}_{-0{,}06}$ *mm, and spaced at the nominal distance with a tolerance of* $^{+0{,}05}_{0}$ *mm.*

NOTE 1 Plugs are tested using a fixed socket-outlet complying with this standard, and having as near to average characteristics as possible.

NOTE 2 Care should be taken to see that the pins of the test plug are in good condition before the test is started.

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NOTE 3 The material of the brass pins of the test plug should be as specified in ISO 1639, designation CuZn39Pb2-M. The microcomposition should be homogenous.

The plug is inserted into and withdrawn from the socket-outlet 5 000 times (10 000 strokes) at a rate of

– *30 strokes per minute.*

NOTE 4 A stroke is an insertion or a withdrawal of the plug.

The test voltage is 48 V, and the test currents are taken from Table 20.

Accessories for a.c. are tested using an alternating current (cos φ = 0,8 ± 0,05).

Accessories for d.c. are tested in a substantially non-inductive circuit. The test current is passed during each engagement of the plug.

The periods during which the test current is passed from the insertion of the plug until the subsequent withdrawal is ($1{,}5^{+0{,}5}_{0}$) s.

The test is made with the connections indicated in Clause 20, the selector switch C being operated as prescribed in that clause.

During the test, no sustained arcing shall occur.

After the test, the specimens shall not show

– *wear impairing their further use,*
– *deterioration of enclosures, insulating linings, or barriers,*
– *damage to the entry holes for the pins that might impair proper working,*
– *loosening of electrical or mechanical connections,*
– *seepage of sealing compound.*

The specimens shall then comply with the requirements of Clause 19, the test current being, however, equal to the test current required for the normal operation test and the temperature rise, at any point, not exceeding 45 K, and they shall withstand an electric strength test made according to 17.2.

The humidity treatment, as for 16.3, is not repeated before the electric strength test of this clause.

The tests of 13.2 and 14.2 are made after the tests of this clause.

22 Force necessary to withdraw the plug

This clause of Part 1 is applicable, except as follows:

Deletion of the second and third paragraphs.

22.1.1 *Replacement in the first paragraph of* "Figure 18" *by* "Figure 101".

22.1.1 *Replacement of the words* "The test plug" *by* "The test plug as shown in Figure 101".

22.1.2 *Replacement in the first paragraph of* "Figure 19" *by* "Figure 102".

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