

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Plugs and socket-outlets for household and similar purposes –
Part 3-1: Particular requirements for socket-outlets incorporating USB power
supply**

**Prises de courant pour usages domestiques et analogues –
Partie 3-1: Exigences particulières pour les socles de prise de courant qui
intègrent l'alimentation électrique par port USB**



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**PLUGS AND SOCKET-OUTLETS
FOR HOUSEHOLD AND SIMILAR PURPOSES –**

**Part 3-1: Particular requirements for socket-outlets
incorporating USB power supply**

FOREWORD

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IEC 60884-3-1 has been prepared by subcommittee 23B: Plugs, socket-outlets and switches, of IEC technical committee 23: Electrical accessories. It is an International Standard.

The text of this International Standard is based on the following documents:

Draft	Report on voting
23B/1360/FDIS	23B/1362/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/standardsdev/publications.

This document shall be used in conjunction with IEC 60884-1:—¹.

This document supplements or modifies the corresponding clauses in IEC 60884-1, so as to convert that publication into the IEC International Standard: Particular requirements for socket-outlets incorporating USB power supply.

Where this document states "addition", "modification" or "replacement", the relevant requirement, test specifications or explanatory matter in IEC 60884-1 shall be adapted accordingly.

Subclauses, figures, tables or notes which are additional to those in IEC 60884-1 are numbered starting from 101. Additional annexes are lettered starting from AA.

A list of all parts in the IEC 60884 series, published 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 document will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific document. At this date, the document will be

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- amended. <https://standards.iteh.ai/catalog/standards/sist/04630498-1336-4c52-a148-82e5b1a961ee/iec-60884-3-1-2021>

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¹ Fourth edition under preparation. Stage at the time of publication: IEC FDIS 60884-1:2021.

PLUGS AND SOCKET-OUTLETS FOR HOUSEHOLD AND SIMILAR PURPOSES –

Part 3-1: Particular requirements for socket-outlets incorporating USB power supply

1 Scope

IEC 60884-1:—, Clause 1 is applicable except as follows:

Replace the first paragraph by the following:

This part of IEC 60884 applies to fixed or portable socket-outlets for AC only, with or without earthing contact, with a rated voltage greater than 50 V but not exceeding 440 V and a rated current not exceeding 32 A, intended for household and similar purposes, either indoors or outdoors, incorporating a USB power supply.

This document defines the safety and EMC requirements for socket-outlets incorporating a USB power supply.

Specifications, performance and dimensional requirements of the USB technologies are not covered by this document; these are defined in the relevant part(s) of IEC 62680.

2 Normative references

[IEC 60884-3-1:2021](https://standards.iteh.ai/catalog/standards/sist/04630498-1336-4c52-a148-82e5b1a961ee/iec-60884-3-1-2021)

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IEC 60884-1:—, Clause 2 is applicable except as follows:

Addition:

IEC 60317-0-1:2013, *Specifications for particular types of winding wires – Part 0-1: General requirements – Enamelled round copper wire*
IEC 60317-0-1:2013/AMD1:2019

IEC 60884-1:—², *Plugs and socket-outlets for household and similar purposes – Part 1: General requirements*

IEC 61000-3-2, *Electromagnetic compatibility (EMC) – Part 3-2: Limits – Limits for harmonic current emissions (equipment input current ≤16 A per phase)*

IEC 61000-4-2, *Electromagnetic compatibility (EMC) – Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test*

IEC 61000-4-3, *Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test*

IEC 61000-4-4, *Electromagnetic compatibility (EMC) – Part 4-4: Testing and measurement techniques – Electrical fast transient/burst immunity test*

² Fourth edition under preparation. Stage at the time of publication: IEC FDIS 60884-1:2021.

IEC 61000-4-5, *Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques – Surge immunity test*

IEC 61000-4-6, *Electromagnetic compatibility (EMC) – Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields*

IEC 61000-4-8, *Electromagnetic compatibility (EMC) – Part 4-8: Testing and measurement techniques – Power frequency magnetic field immunity test*

IEC 61000-4-11, *Electromagnetic compatibility (EMC) – Part 4-11: Testing and measurement techniques – Voltage dips, short interruptions and voltage variations immunity tests for equipment with input current up to 16 A per phase*

IEC 62368-1:2018, *Audio/video, information and communication technology equipment – Part 1: Safety requirements*

IEC 62368-3:2017, *Audio/video, information and communication technology equipment – Part 3: Safety aspects for DC power transfer through communication cables and ports*

CISPR 32, *Electromagnetic compatibility of multimedia equipment – Emission requirements*

3 Terms and definitions

IEC 60884-1:—, Clause 3 is applicable except as follows:

Replacement of NOTE 3:

NOTE 3 The term "accessory" is used as a general term covering socket-outlets and socket-outlets incorporating a USB power supply; the term "portable accessory" covers portable socket-outlets and portable socket-outlets incorporating a USB power supply.

Add the following terms and definitions:

3.101

universal serial bus

USB

standardized bus using serial transmission

[SOURCE: IEC 60050-171:2019, 171-04-48, modified – Note 1 to entry is deleted.]

3.102

USB port

IEC 62680 series female connector used to supply power to a connected portable device

3.103

USB power supply

electronic circuit, including connections to the socket-outlet, PCB, connectors, internal wiring and similar that converts mains voltage into a lower voltage with smoothed direct current that is delivered through one or more USB port

Note 1 to entry: USB connector types are defined in the IEC 62680 series.

3.104

SELV

electric system in which the voltage cannot exceed the value of extra-low voltage:

– under normal conditions and

– under single fault conditions, including earth faults in other electric circuits

Note 1 to entry: SELV is the abbreviation for safety extra-low voltage.

[SOURCE: IEC 60050-826:2004, 826-12-31, modified – "SELV system" has been replaced with "SELV".]

3.105

hazardous live part

live part with a voltage higher than 25 V AC or 60 V DC ripple free in dry conditions or 12 V AC or 30 V DC in wet conditions

Note 1 to entry: Ripple free is conventionally an RMS ripple voltage not more than 10 % of the DC component.

Note 2 to entry: For the purpose of this document, parts of the USB ports delivering SELV are not considered to be hazardous live parts as the output voltage of the USB remains below the limits of hazardous live parts.

3.106

rated output voltage

voltage assigned by the manufacturer to USB port

3.107

rated output current

current assigned by the manufacturer to USB port

3.108

rated output power

electric power output assigned by the manufacturer to USB port

Note 1 to entry: The rated output power is expressed in W.

3.109

maximum output power

highest output power attainable from the USB power supply

Note 1 to entry: The maximum output power can be different from the rated output power.

Note 2 to entry: The maximum output power can be shared or cumulated through several ports.

4 General requirements

IEC 60884-1:—, Clause 4 is applicable except as follows:

Add the following at the end of the clause:

Where reference to IEC 62368-1 and IEC 62368-3 is made in this document, the following parameters are to be applied:

- a) Overvoltage category:
 - Portable accessories: Minimum Cat II
 - Fixed accessories: Minimum Cat III
- b) Pollution degree: 2
- c) Material class: min. IIIa (CTI = 175)
- d) Classification of use: By ordinary persons.

5 General remarks on tests

IEC 60884-1:—, Clause 5 is applicable except as follows.

5.4 Additional samples

IEC 60884-1:—, 5.4 is applicable except as follows:

Add the following before the last paragraph:

For the test of 17.2.1 b), 17.3, Clause 20, Clause 21 and Clause 22, additional specimens with the USB power supply unit disconnected may be necessary.

For the tests of 24.101 a new set of specimens is required.

For the tests of Clause 101, additional specimens may be necessary.

For the tests of 102.3, additional specimens are required.

Replace Table 1 of IEC 60884-1:— with the following:

Table 1 – Survey of specimens needed for tests

Clauses and subclauses of this document		Number of specimens	
		Fixed socket-outlets	Portable socket-outlets
6	Ratings	A	A
7	Classification	A	A
8	Marking	A	A
9	Checking of dimensions	ABC	ABC
10	Protection against electric shock	ABC	ABC
11	Provision for earthing	ABC	ABC
12	Terminals and terminations	ABC ^{b, c}	ABC
13	Construction of fixed socket-outlets	ABC ^{d, e}	–
14	Construction of plugs and portable socket-outlets	–	ABC ^{d, e}
15	Interlocked socket-outlets	ABC	ABC
16	Resistance to ageing, to harmful ingress of water and to humidity	ABC ^f GHI ^o	ABC ^f GHI ^o
17	Insulation resistance and electric strength	ABC ^g	ABC ^g
17.2.1 b)	Socket-outlets insulation resistance	GHI ^o	GHI ^o
17.3	Electric strength test	GHI ^o	GHI ^o
18	Operation of earthing contacts	ABC	ABC
19.101 a)	Socket-outlets incorporating USB power supply temperature rise	GHI ^o	GHI ^o
19.101 b)	Socket-outlets incorporating USB power supply temperature rise	ABC	ABC
19.101 c)	Socket-outlets incorporating USB power supply temperature rise	ABC	ABC
20	Breaking capacity	GHI ^o	GHI ^o
21	Normal operation	GHI ^o	GHI ^o
22	Force necessary to withdraw the plug	GHI ^o	GHI ^o
23	Flexible cables and their connection	–	ABC ^h
24	Mechanical strength	ABC ^{i, k}	ABC
24.101	Mechanical tests of USB ports	KLM ^q	KLM ^q
25	Resistance to heat ⁱ	ABC	ABC

Clauses and subclauses of this document		Number of specimens	
		Fixed socket-outlets	Portable socket-outlets
26	Screws, current-carrying parts and connections	ABC	ABC
27	Creepage distances, clearances and distances through sealing compound	ABC	ABC
29	Resistance to rusting	ABC	ABC
28.1	Resistance to abnormal heat and to fire	DEF	DEF
28.2	Resistance to tracking ^k	DEF	DEF
31	EMC Requirements	J ^p	J ^p
101	Abnormal conditions ^q	NOP ^r	NOP ^r
102.3	Application of the clauses of IEC 62368-1 and IEC 62368-3 ^q	QRS ^t	QRS ^t
<p>^a One extra set of specimens is required for the test of 10.6.</p> <p>^b One extra set of specimens is needed for each type of conductor for 12.2.6.</p> <p>^c One extra set of specimens can be required for the test of 12.3.10. Five extra screwless terminals are used for the test of 12.3.11 and one extra set of specimens is used for the test of 12.3.12.</p> <p>^d One extra set of membranes is required for each of the tests of 13.22 and 13.23.</p> <p>^e One extra set of specimens can be required to verify that the mechanical strength of the pin does not depend on the plastic material.</p> <p>^f One extra set of specimens is needed for 16.1.</p> <p>^g One extra set of specimens of socket-outlets fitted with pilot lamps may be used for the tests of Clause 17.</p> <p>^h One extra set of specimens is required for the tests of 23.2 and 23.4 for non-rewirable accessories for each type of cable and cross-sectional area.</p> <p>ⁱ One extra set of specimens is required for the tests of 24.9 for shuttered socket-outlets.</p> <p>^j Void.</p> <p>^k One extra set of specimens is required for the tests of 24.13.2 and 24.13.3.</p> <p>^l One extra set of aged specimens can be used for the tests of 25.3 and 25.4.</p> <p>^m One extra set of specimens can be used.</p> <p>ⁿ Void</p> <p>^o One extra set of aged specimens can be used with the USB power supply disconnected. The set of specimens ABC can be used if it is possible to easily disconnect the USB power supply.</p> <p>^p New specimen can be used if the specimen is no longer working.</p> <p>^q For these tests, additional specimens can be necessary.</p> <p>^r For these tests, additional specimens can be necessary.</p> <p>^s For these tests, additional specimens can be necessary.</p> <p>^t For these tests, additional specimens are required.</p>			

6 Ratings

IEC 60884-1:—, Clause 6 is applicable except as follows.

Add the following new subclauses:

6.101 Rated voltage

The rated voltage of the accessory shall be selected by the manufacturer according to the nominal voltage of the fixed electrical installation where the accessory is intended to be installed.

NOTE 101 In the following country the rated voltage of the USB – socket-outlet combination, shall be according to IEC 60884-1 Table 1: ZA.

6.102 USB output ratings

The USB power supply shall have a rated output voltage and rated output current or rated output power not exceeding the specifications of the USB connectors, as defined in the relevant part(s) of IEC 62680.

Compliance is checked by inspection of the markings and/or the manufacturer's documentation.

7 Classification

IEC 60884-1:—, Clause 7 is applicable.

8 Marking

IEC 60884-1:—, Clause 8 is applicable except as follows:

8.1 General

IEC 60884-1:—, 8.1 is applicable except as follows:

Add the following paragraphs at the end of the subclause.

In addition, accessories shall be marked with:

- rated output power of USB port in Watt, unless the output rating is expressed in Volt and Ampere;
- rated input frequency in Hertz, unless the power supply is designed for both 50 Hz and 60 Hz.

8.2 Symbols

Add the following items before Note 1:

— — —

(IEC 60417-5031 (2002-10))
 Watt..... W
 Hertz Hz

Add the following Note after Note 4:

NOTE 101 The following is an example of the marking for current, voltage and nature of USB output:

5V — — — 2,1A, alternatively: $\frac{5V}{2,1A}$ — — —, alternatively: 5V DC 2100mA

Add the following new subclause:

8.101 Particular requirements for socket-outlets incorporating a USB power supply

The following additional information is recommended to be marked on the accessory and/or given in the manufacturer's documentation:

- nature of the output voltage;
- rated output voltage;
- rated output current;

– rated output power.

The minimum conductor size used for the connection of a USB power supply with dedicated terminals, according to Clause 12 of this document, shall be marked on the accessories and/or mentioned in the manufacturer's documentation.

Compliance is checked by inspection.

NOTE 101 In the following country, USB outlets that are incorporated into fixed socket-outlets are to be fitted with a disconnect switch that interrupts the live pole to the USB power supply: ZA.

Accessories incorporating a USB power supply are not class II equipment and shall not be marked with the symbol for class II construction.

9 Checking of dimensions

IEC 60884-1:—, Clause 9 is applicable except as follows:

9.1 General

Add the following paragraph at the end of 9.1:

Relevant mechanical dimensions of the USB connectors are given in the associated drawings in the relevant part(s) of IEC 62680.

Mechanical interference between either the relevant plug(s) and the USB port(s) preventing their normal insertion and withdrawal or causing a partial insertion condition shall be prevented when considering basic plugs, and as far as possible when considering the wide diversity of adaptors and plugs shape.

[IEC 60884-3-1:2021](https://standards.iteh.ai/catalog/standards/sist/04630498-1336-4c52-a148-82e3b1a961ec/iec-60884-3-1-2021)

Compliance is checked by inspection and measurement in reference to the relevant standard sheet or USB connectors' design.

9.3 Permitted deviations

9.3 is not applicable to USB connectors.

10 Protection against electric shock

IEC 60884-1:—, Clause 10 is applicable except as follows:

10.1 General

Replace the first paragraph with the following:

Socket-outlets shall be so designed and constructed that when they are mounted and/or wired as for normal use, hazardous live parts are not accessible, even after removal of parts which can be removed without the use of a tool.

10.2 Accessibility of live parts during normal use

Add the following paragraph at the end of 10.2:

10.2 is not applicable to the accessible metal parts of USB ports.

10.4 Single pole insertion

Add the following paragraphs after the Note:

It shall not be possible to introduce a plug making contact between a hazardous live part of the socket-outlet and a conductive part of the USB port(s).

Compliance is checked by inspection using plugs compatible with the socket-outlet. In case of doubt, an electrical indicator supplied with a voltage between 40 V and 50 V is used.

NOTE 101 Standardized configurations of existing systems are described in IEC/TR 60083.

10.7 Socket-outlets with increased protection

Replace the first paragraph as follows:

Socket-outlets with or without lid, classified according to 7.2.1.2, shall be so constructed that, when mounted and wired as in normal use, hazardous live parts shall not be accessible with a steel gauge according to Figure 8 (1 mm gauge).

Add the following new subclauses:

10.101 Metal parts of the USB ports

Metal parts of the USB ports shall not be earthed.

Compliance is checked by inspection and by the test of Clause 27.

10.102 Output voltage protective measure

To ensure protection against electric shock, the USB power supply output voltage shall be SELV.

Compliance is checked by the tests of Clause 17, Clause 27, Clause 101, and Clause 102.

11 Provision for earthing

IEC 60884-1:—, Clause 11 is applicable.

12 Terminals and terminations

IEC 60884-1:—, Clause 12 is applicable except as follows:

Add the following paragraphs at the end of 12.1:

Dedicated terminals for a USB power supply shall accept at least one conductor of the same type and size as the socket-outlet in which it is incorporated.

If socket-outlet terminals are used for the connection of a USB power supply, the terminal connection capacity requirements of IEC 60884-1:— still apply after connection.

In addition, the minimum size of the conductor to be used shall be marked on the accessories and/or mentioned in the manufacturer's documentation.