BS EN IEC 63002:2021

BSI Standards Publication

Interoperability specifications and communication method for external power supplies used with computing and consumer electronics devices

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National foreword

This British Standard is the UK implementation of EN IEC 63002:2021. It is identical to IEC 63002:2021. It supersedes BS IEC 63002:2016, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee EPL/100, Audio-visual equipment.

A list of organizations represented on this committee can be obtained on request to its committee manager.

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN IEC 63002

August 2021

ICS 31.020; 35.200

Supersedes EN 63002:2017 and all of its amendments and corrigenda (if any)

English Version

Interoperability specifications and communication method for external power supplies used with computing and consumer electronics devices (IEC 63002:2021)

Spécifications d'interopérabilité et méthode de communication pour les alimentations externes utilisées avec les dispositifs informatiques et les dispositifs électroniques grand public (IEC 63002:2021)

Interoperabilitäts-Spezifikationen und Kommunikationsverfahren für externe Stromversorgungen zur Anwendung für Computer- und Unterhaltungselektronikgeräte (IEC 63002:2021)

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European Committee for Electrotechnical Standardization
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European foreword

The text of document 100/3463/CDV, future edition 2 of IEC 63002, prepared by IEC/TC 100 “Audio, video and multimedia systems and equipment” was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 63002:2021.

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) 2022–04–01
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2024–07–01

This document supersedes EN 63002:2017 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.

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 63002:2021 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 standards indicated:

IEC 62684 NOTE Harmonized as EN IEC 62684

IEC 62680-2-1 NOTE Harmonized as EN 62680-2-1

IEC 62680-2-2 NOTE Harmonized as EN 62680-2-2

IEC 62680-2-3 NOTE Harmonized as EN 62680-2-3

IEC 62680-3-1 NOTE Harmonized as EN 62680-3-1

IEC 62680-1-4 NOTE Harmonized as EN IEC 62680-1-4

IEC 61000-3-2 NOTE Harmonized as EN IEC 61000-3-2

IEC 61000-3-3 NOTE Harmonized as EN 61000-3-3

IEC 62623 NOTE Harmonized as EN 62623

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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.cenelec.eu.

Publication	Year	Title	EN/HD	Year
IEC 60950-1	-	Information technology equipment - Safety- - Part 1: General requirements		-
IEC 60990	-	Methods of measurement of touch current and protective conductor current	EN 60990	-
IEC 62368-1	2018	Audio/video, information and communication technology equipment - Part 1: Safety requirements	EN IEC 62368-1	2020
IEC 62680-1-1	-	Universal serial bus interfaces for data and power - Part 1–1: Common components - USB Battery Charging Specification, Revision 1.2	EN 62680-1-1	-
IEC 62680-1-2	2021	Universal serial bus interfaces for data and power - Part 1–2: Common components - USB Power Delivery specification	EN IEC 62680-1-2	2021
IEC 62680-1-3	-	Universal serial bus interfaces for data and power - Part 1–3: Common components - USB Type-C® Cable and Connector Specification	EN IEC 62680-1-3	-

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

INTEROPERABILITY SPECIFICATIONS AND COMMUNICATION METHOD FOR EXTERNAL POWER SUPPLIES USED WITH COMPUTING AND CONSUMER ELECTRONICS DEVICES

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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This document has been prepared by technical area 18: Multimedia home systems and applications for end-user networks, of IEC technical committee 100: Audio, video and multimedia systems and equipment. It is an International Standard.

This second edition cancels and replaces the first edition published in 2016. This edition constitutes a technical revision.

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

a) title is changed from *Identification and communication interoperability method for external power supplies used with portable computing devices*;
b) Clause 4, *EPS interoperability based on USB technologies*, is added;
c) Clause 5, *EPS specification*, adds hardware and protection requirements; overvoltage protection is changed from optional to normative;

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d) Annex B and Annex C are added, providing an explanation of the design features in USB Power Delivery that enhance reliability and an explanation of the concepts of charge rate and power.

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

CDV	Report on voting
100/3463/CDV	100/3540B/RVC

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.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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INTRODUCTION

The objective of this document is to enable common charging interoperability of external power supplies (EPSs) used with the increasing variety of computing and consumer electronics devices that implement IEC 62680-1-3 (USB Type-C®[1] Cable and Connector Specification) and IEC 62680-1-2 (USB Power Delivery). Broad market adoption of this document is expected to make a significant contribution to the global goals of consumer convenience and re-usability of power supplies by expanding common charging interoperability across different product categories while preserving backwards compatibility with the installed base of billions of IEC 62680 compliant devices worldwide.

This document specifies the minimum technical requirements for interoperability and includes recommendations for EPS functionality when used with computing and electronics devices. The approach taken by this document, focused on enabling common charging interoperability, can allow manufacturers to innovate in aspects such as technical design, system performance, and energy efficiency. Furthermore, common charging interoperability enables manufacturers to design specific EPSs that match the requirements of target devices (functionality, cost, etc.) and use cases, while at the same time enabling consumers to use the EPS for charging other IEC 62680 compliant devices, across various product types.

IEC 62680-1-3 adoption is well underway in global markets for a wide range of devices using as much as 100 W, including notebook computers, tablets, smartphones, small form-factor desktop computers, and other consumer electronics devices. This document enables the reporting of the identity and power characteristics of power sources (EPSs and other Sources) supported by IEC 62680-1-3 (USB Type-C) and specifies interoperability guidelines when using IEC 62680-1-2 (USB Power Delivery). The method for identification of a specific power source can enable equipment manufacturers to ensure compliant operation using these specifications and promotes data communication that can be used by the device to predict and mitigate interoperability concerns when an unfamiliar or incompatible EPS is connected to the device. EPS power delivery applications can in the future extend beyond 100 W given updates to IEC 62680 that appropriately address the needs of higher-power products in the computing and consumer device market.

This document also provides important information regarding consumer safety, system reliability as well as relevant global standards and regulatory compliance.

Other international and regional standards, and government policies for "universal" or "common power adapters" that reference this document are expected to take into account open technical and regulatory compliance issues that are associated with untested or arbitrary combinations of EPSs and devices such as those identified in Annex A, as well as the limitations and issues with approaches to define "common chargers" in meeting market needs. For clarity, this document focuses on interoperability specifications in order to support global industry in developing safe, convenient, environmentally conscious, and end-to-end interoperable charging solutions that meet regulatory compliance and market requirements.

[1] USB4™ and USB Type-C® are trademarks of the Universal Serial Bus Implementers Forum (USB-IF). This information is given for the convenience of users of this document and does not constitute an endorsement by IEC.

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INTEROPERABILITY SPECIFICATIONS AND COMMUNICATION METHOD FOR EXTERNAL POWER SUPPLIES USED WITH COMPUTING AND CONSUMER ELECTRONICS DEVICES

1 Scope

This document defines common charging interoperability guidelines for power sources (external power supplies (EPSs) and other Sources) used with computing and consumer electronics devices that implement IEC 62680-1-3 (USB Type-C Cable and Connector Specification).

This document defines normative requirements for an EPS to ensure interoperability; in particular, it specifies the data communicated from a power source to a device (Figure 1) and certain safety elements of the EPS, cable, and device. While the requirements focus of this document is on the EPS and the behaviour at its USB Type-C connector interface, it is also important to comprehend cable assembly and device capabilities and behaviours in order to assure end-to-end charging interoperability. This document does not apply to all design aspects of an EPS. This document does not specify regulatory compliance requirements for aspects such as product safety, EMC or energy efficiency.

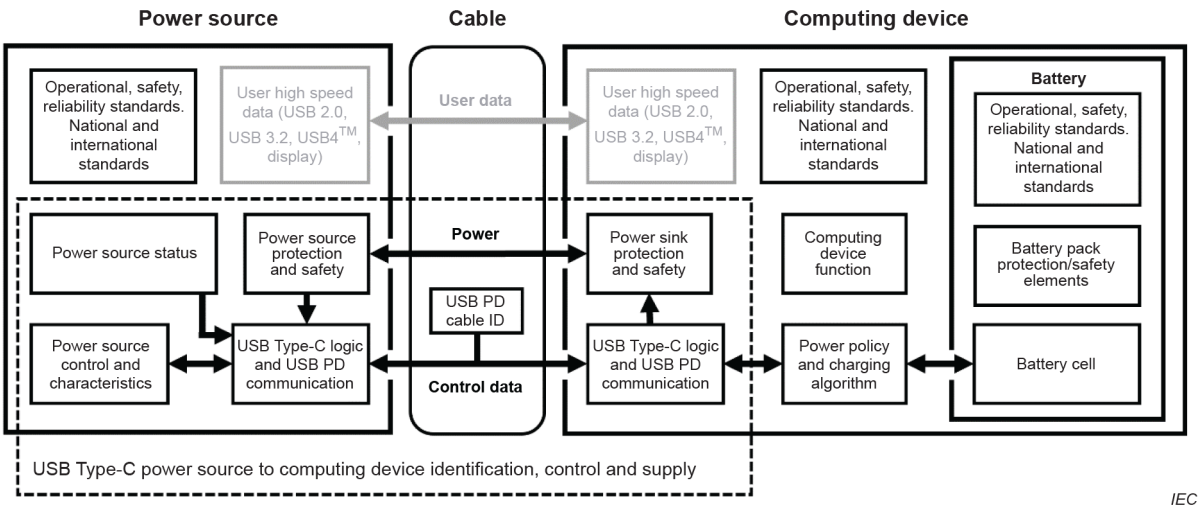

Figure 1 – Scope of the identification, communication and control method

This document provides recommendations for the behaviour of a device when used with a power source compliant with this document. It specifies the minimum hardware specification for an EPS implementing IEC 62680-1-3. This document also specifies the data objects used by a charging system utilizing IEC 62680-1-2 to understand the identity, design and performance characteristics, and operating status of an external power supply. IEC 62680-1-2 focuses on power delivery applications ranging to 100 W for a variety of computing and consumer electronics devices including notebook computers, tablets, smartphones, small form-factor desktops, monitor displays and other related multimedia devices.

This document relies on established mechanical and electrical specifications, and communication protocols specified by IEC 62680-1-2 and IEC 62680-1-3. These specifications support methods for establishing the best performing interoperability between untested combinations of EPS and devices with the aim of improving consumer satisfaction.

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Information describing the USB charging interoperability model, overview of USB Type-C and USB Power Delivery specifications, and factors for charging performance are also provided to support implementation of this document.

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 60950-1, *Information technology equipment – Safety – Part 1: General requirements*

IEC 60990, *Methods of measurement of touch current and protective conductor current*

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

IEC 62680-1-1, *Universal Serial Bus interfaces for data and power – Part 1-1: Common components – USB Battery Charging Specification, Revision 1.2*

IEC 62680-1-2:2021, *Universal Serial Bus interfaces for data and power – Part 1-2: Common components – USB Power Delivery specification*

IEC 62680-1-3, *Universal Serial Bus interfaces for data and power – Part 1-3: Common components – USB Type-C Cable and Connector Specification*

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1.1
vendor identification
VID
unique 16-bit unsigned value assigned by the USB-IF to a given vendor

3.1.2
power source
power supply
Source
device designed to comply with IEC 62680-1-2 that supplies power over V_{BUS}

EXAMPLE A USB connector on a PC, laptop computer, vehicle, AC outlet, docking station, battery pack, or EPS.

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3.1.3
Sink
power sink
device designed to comply with IEC 62680-1-2 that receives and consumes power over V_{BUS}

EXAMPLE A computing device.

Note 1 to entry: Sometimes referred to as the device.

3.1.4
external power supply
EPS
power source contained in a separate physical enclosure external to the device casing and designed to convert mains power supply to lower DC voltage(s) for the purpose of powering the device

EXAMPLE A charging block.

3.1.5
Programmable Power Supply
PPS
optional capability in IEC 62680-1-2 where a device (Sink) can adaptively adjust the EPS (Source) output voltage in small increments and set maximum current within its advertised range

3.1.6
Fixed Supply
power source whose output voltage is regulated

Note 1 to entry: Standardized voltages in IEC 62680-1-2:2021 are 5 V, 9 V, 15 V and 20 V.

3.1.7
USB PD power
PDP
nominal power capacity of the charger defined by IEC 62680-1-2 for use to indicate to consumers

Note 1 to entry: The PDP rating is indicated both on the USB charger certification logo and within the USB PD source capabilities advertisement to the Sink. For any given PDP rating, the minimum capabilities in terms of supported voltages and currents are deterministic, as defined in IEC 62680-1-2.

3.1.8
charging cable
cable used between the EPS and device to be charged

Note 1 to entry: The cable connection to the EPS is a USB Type-C plug in accordance with IEC 62680-1-3. The cable connection to the device can be either a USB Type-C plug, a legacy USB plug (e.g. USB Micro-B in accordance with IEC 62680-2-2), or a non-USB device-specific connection (either permanent or detachable). Charging cables can be application-specific to enable interoperability between the USB Type-C-based EPS defined by this document and both existing and future devices and including devices that are not able to accommodate USB Type-C receptacles, e.g. smart watches.

3.1.9
captive cable
permanently attached cable
cable that has a USB Type-C plug on one end and is either hard-wired into a device on the other end or has a device-specific plug on the other end

Note 1 to entry: When a device-specific plug is used on one end, the cable can be detachable in a physical sense but is considered "functionally captive" to the device given it does not use a USB-defined connector on the device end but otherwise functions as a USB device. This definition has remained the USB definition since it was originally specified in IEC 62680-2-1 (USB 2.0).

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