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INTERNATIONAL STANDARD

Audio/video, information and communication technology equipment - Safety - Power transfer between communication equipment ports using communication wires and cables cabling at non-mains voltage above 60 V DC and ES2/ES3 AC voltage

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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Audio/video, information and communication technology equipment - Safety - Power transfer between communication equipment ports using communication wires and cables cabling at non-mains voltage above 60 V DC and ES2/ES3 AC voltage

FOREWORD

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IEC 63316 was prepared by IEC Technical Committee 108: Safety of electronic equipment within the field of audio/video, information technology and communication technology. It is an International Standard.

This first edition cancels and replaces Clause 6 of IEC 62368-3 published in 2017. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to Clause 6 of IEC 62368-3 published in 2017:

a) DC power transfer at voltages above 60 V DC but ≤ 120 V DC (ES2), including telecommunications networks formerly known as TNV-3;

b) DC power transfer at voltages ≥ 120 V DC at ES3, such as RFT circuits and associated telecommunications equipment;

c) AC/DC remote powering above ES1 over coaxial cable in cable television utility service provider circuits for repeaters, amplifiers, and ONUs;

d) clarification on communication cable permitting power transfer, regardless of data transmission presence.

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

Draft	Report on voting
108/856/FDIS	108/858/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/publications.

In this document, the following print types are used:

– compliance statements: *italic type*;

– terms defined in Clause 3: **bold type**.

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, or

– revised.

1 Scope

This document prescribes **safeguards**, test methods and compliance requirements intended to reduce the risk of electrical shock and fire associated with voltage and current at voltages greater than 60 V DC and 60 V AC.

This document applies to equipment ports intended to supply and receive operating power from communications equipment ports using communication wires and cables. It covers particular requirements for circuits that are designed to transfer AC or DC power from a **power sourcing equipment (PSE)** (3.1.2) to a **powered device (PD)** (3.1.3), including repeaters, amplifiers, Optical Network Units, Remote DSLAMs, service provider terminating equipment, remote telecommunications cabinets and equipment, and midspan passive equipment connected to the **PSE** (3.1.2) and **PD** (3.1.3).

The power transfer of equipment ports covered by this document uses non-**mains** AC voltage or non-**mains** DC voltage above 60 V DC classified as ES2 according to 5.2.1.2 of IEC 62368-1:2023 or, in some very controlled cases, classified as ES3 according to IEC 62368-1:2023.

EXAMPLES

- DC power transfer using voltages above 60 V DC but ≤ 120 V DC, classified as ES2;
- Some telecommunications networks where the voltage was formerly called TNV-3 (see IEC 62368-1:2023, Table W.3), typically used for line, span or express powering outside North America, Long Range Reverse Power Feeding, HDSLx line powering ISDN, Line Powering Primary Rate E1;
- Some North American telecommunications networks between the utility service providers´ **PSE** (3.1.2) and service providers side of the **PD** (3.1.3) at the **PNI** (3.1.8);
- For DC power transfer using voltages ≥ 120 V DC at ES3: **RFT circuits** and the associated telecommunications network equipment and cabling used by communications service providers and communications utilities (for example, line powered E1/T1, HDSLx, SHDSLx, xDSL, repeaters, and telecommunications line powering up or line powering down converters as applicable), Optical Network Units, remote DSLAMs, etc. These **RFT circuits** are used between the utility service providers **PSE** (3.1.2) and service providers side of the **PD** (3.1.3) at the **PNI** (3.1.8). The customer facing ports of this equipment are at voltage not exceeding 60 V DC and are covered by IEC 62368-1:2023, see Annex A for deployment topologies;
- For AC/DC remote powering voltage above ES1 over coaxial cable in circuits used by cable television utility service providers for repeaters, amplifiers, Optical Network Units. The customer facing ports of this equipment are at voltage not exceeding 60 V DC that are covered by IEC 62368-1:2023.

NOTE 1 Any communications cable that permits power transfer between communication equipment is considered a communication cable even if communication does not take place. For example, a line powering up or line powering down converters as applicable used to power remote telecommunications equipment, can provide limited communications **RFT** power and not necessarily any superimposed data or signalling.

This document does not cover equipment interfaces within the scope of IEC 63315.

NOTE 2 IEC 63315 covers equipment intended to either supply or receive charging, or operating power from ICT interfaces using ICT wires and cables such as PoE, USB, HDMI, etc, or any of these combined.

This document does not cover ringing signals that are in the scope of IEC 62368-1 or in the scope of IEC 62949:2017.

This document does not cover traditional telecommunications technologies which operate at voltages not exceeding 60 V DC (circuits classified as ES1 according to 5.2.1.1 of IEC 62368-1:2023 and Table ID1a, 1b, or 1c in Table 13 of IEC 62368-1:2023) with or without ringing signals (classified as ES2 according to 5.2.1.1 of IEC 62368-1:2023 and **external circuit** ID1a, 1b, or 1c in Table 13 of IEC 62368-1:2023). Examples of traditional telecommunications technologies include Analogue Telephony, ISDN, T1, E1, VDSL, SHDSL, DDS, etc.

This document does not cover communications over **mains** and high-voltage power transmission and distribution lines.

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 60695-11-5:2016, *Fire hazard testing - Part 11-5: Test flames - Needle-flame test method - Apparatus, confirmatory test arrangement and guidance*

IEC 60728-11:2023, *Cable networks for television signals, sound signals and interactive services - Part 11: Safety*

IEC 62368-1:2023, *Audio/video, information and communication technology equipment - Part 1: Safety requirements*

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 62368-1:2023 and the following apply.

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

– IEC Electropedia: available at https://www.electropedia.org/

– ISO Online browsing platform: available at https://www.iso.org/obp

3.1.1
building wiring
ICT and AV wires or cables that are intended to be installed wholly within a structure

EXAMPLE Wire or cables installed in walls, under floors, in plenums, risers, etc. in a building or structure, that are used to connect ICT and AV equipment in different locations within the building and that is not **mains**. It also includes **devices** associated with the interconnection of the equipment. The cables can be conductive or non-conductive, such as fiber optic cable and connectorization.

Note 1 to entry: Under certain circumstances, **building wiring** (3.1.1) can run outside the building for connection to equipment (for example, a video camera outside of the building).

Note 2 to entry: Within this document **building wiring** (3.1.1) excludes dedicated wires and cables dedicated to specific known equipment and for connecting known equipment on each end at the time of installation of such controlled wire and cables.

3.1.2
power sourcing equipment
PSE
equipment, other than dedicated external power supply unit intended to supply specific equipment, supplying AC or DC power from a communications port to other communications equipment through communications wiring or cables

Note 1 to entry: It should be noted that ISO/IEC/IEEE 8802-3:2021 [1] has a similar but different definition, however PoE is not covered by this document.

3.1.3
powered device
PD
equipment supplied with AC or DC power by a **PSE** (3.1.2) into a communications port from communications wiring or cables

Note 1 to entry: It should be noted that ISO/IEC/IEEE 8802-3:2021 [1] has a similar but different definition, however PoE is not covered by this document.

Note 2 to entry: Some in-line **devices** can just function as a **PSE** (3.1.2) to inject power into the cable connecting to **PD** (3.1.3) equipment. ISO/IEC/IEEE 8802-3:2021 [1] identifies such **devices** as Midspan **PSE** (3.1.2), however PoE is not covered by this document.

Note 3 to entry: Some **PD** (3.1.3) equipment can also have a **PSE** (3.1.2) output to pass on unused power to other **PD** (3.1.3) equipment, such as repeaters and in-line amplifiers.

3.1.4
information and communication technology network
ICT network
metallically terminated transmission medium and its associated equipment and ICT wiring and communication cables

Note 1 to entry: The cable or wiring consists of two or more conductors intended for communication or power transfer between the various pieces of communications related equipment. The equipment can be located within the same or separate structures, buildings or locations, excluding:

- the **mains** system for supply, transmission and distribution of electrical power, if used as a communication transmission medium;
- a dedicated HBES/BACS network. The requirement for interconnection with **external circuits** in an HBES/BACS network is given in IEC 63044-3:2017 and IEC 63044-3:2017/AMD1:2021 [2];
- end customer terminal equipment and associated wiring and cabling that is operating at ES1 DC voltages.

Note 2 to entry: This can include twisted pairs, and can include circuits, that are subjected to transients as indicated by Table 13 of IEC 62368-1:2023 (assumed to be 1,5 kV).

Note 3 to entry: An **ICT network** can be:

- publicly or privately owned;
- subject to longitudinal (common mode) as well as transverse (differential) voltages and currents induced from nearby power lines or electric traction lines.

Note 4 to entry: Examples of ICT networks addressed within this document are:

- a telecommunication service provider or utility's RFT T1/E1, HDSLx, or span/line-powering network that is metallically isolated from the end customers terminal equipment (see Annex A);
- a RFT public data network located in the service providers utility space;
- a Long Range reverse powering network operating above 60 V DC;
- a private RFT network with electrical interface characteristics similar to the above;
- a cable television network located in the service providers utility space.

Note 5 to entry: For information about circuit voltages and signals, which can be present, see Annex H of IEC 62368-1:2023. For **RFT**, see ITU-T K.50 [3]. For remote powering voltage above ES1 over coaxial cable in circuits used by cable television utility service providers, see IEC 60728-11.

3.1.5
remote feeding telecommunication circuit
RFT circuit
equipment circuit within the **ICT network** (3.1.4), without a direct **mains** connection, or a limited current circuit, or ES1 PS2 circuit, or some ES2 PS2 circuits intended, to supply or receive DC power, at voltages, currents and powers that do not exceed defined values under specified operational conditions when connected to paired-conductor communications network on which overvoltages are possible

Note 1 to entry: A telecommunications signal is not required to be present on an **RFT circuit** (3.1.5), but the power delivered is used to provide a telecommunication service.

Note 2 to entry: Specified conditions include **normal operating conditions** and **single fault conditions** and can include **abnormal operating conditions** and **basic safeguard** and **supplementary safeguard** failure conditions.

Note 3 to entry: In the context of this document, **RFT circuit**s (3.1.5) can be regarded as ES3 and some ES2 voltages which are intended to become **external circuits** as defined in Table 13 of IEC 62368-1:2023. **RFT circuits** (3.1.5) are defined and based on ITU-T K.50 [3].

3.1.6
RFT-C circuit
RFT circuit (3.1.5) which is so designed and safeguarded that under **normal operating conditions, abnormal operating conditions,** and **single fault conditions**, the current in the circuit does not exceed defined values

Note 1 to entry: ITU-T K.50 [3] is the basis for these limits.

Note 2 to entry: The limit values of current under **normal operating conditions** and **single fault conditions** are specified in 6.4.1.1.

Note 3 to entry: **RFT-C** is used outside of North America, unless it also meets **RFT-V** limits (see Annex A).

3.1.7
RFT-V circuit
RFT circuit (3.1.5) which is so designed and safeguarded that under **normal operating conditions** and **single fault conditions**, the voltage and current are limited, and the **accessible** area of contact is limited

Note 1 to entry: ITU-T K.50 [3] is the basis for these limits.

Note 2 to entry: The limit values of voltage under **normal operating conditions** and **single fault conditions** are specified in 6.4.1.2.

Note 3 to entry: **RFT-V** is used only in North America as it does not have safe limits from conductor to conductor. Most limits are conductor to earth (see Annex A).

3.1.8
public network interface
PNI
point of demarcation between public and private network

Note 1 to entry: In many cases, the public network interface is the point of connection between the network provider's facilities and the customer premises cabling.

[SOURCE: ITU-T K.50:2018 [3], 3.2.12]

3.1.9
residual differential current device
RCD
mechanical switching **device** or association of **devices** designed to make, carry and break currents under normal service conditions and to cause the opening of the contacts when the residual current attains a given value under specified conditions

Note 1 to entry: This term is also known as ground-fault circuit interrupter or GFCI.

Note 2 to entry: A **RCD** (3.1.9) can be a combination of various separate elements designed to detect and evaluate the residual current and to make and break current.

Note 3 to entry: In the following countries an **RCD** (3.1.9) can be either electrical, electronic, mechanical or a combination thereof: US, Canada, Japan, United Kingdom.

[SOURCE: IEC 60050-442:2019 [4], 442-05-02, modified – Addition of "differential" in the term; addition of the notes.]

3.2 Abbreviated terms

AV	audio/video
BACS	building automation and control system
DDS	digital data service
DSL	digital subscriber line
DSLAM	digital subscriber line access multiplexer
E1	E-carrier 1
EUT	equipment under test
GFCI	ground-fault circuit interrupter
HBES	home and building electronic system
HDMI	high-definition multimedia interface
HDSL	high bit-rate digital subscriber line
ICT	information and communication technology
ISDN	integrated service digital network
LPS	limited power source
ONU	optical network unit
PoE	power over ethernet
RFT	remote feeding telecommunication
SHDSL	symmetric high bit-rate digital subscriber line
T1	transmission system 1
TNV	telecommunication network voltage
USB	universal serial bus
VDSL	very high speed digital subscriber line

4 General requirements

The subclauses of IEC 62368-1:2023 apply as far as reasonable. However, this document takes precedence when there is a conflict. Where safety aspects are similar to those of IEC 62368-1:2023, the relevant clause or subclause of IEC 62368-1:2023 is given for reference in a note in the relevant subclause. Where a requirement in this document refers to a requirement or criterion of IEC 62368-1:2023, a specific reference to IEC 62368-1:2023 is made.