ISO/IEC 30129

Edition 1.0 2015-10

INTERNATIONAL STANDARD

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Information technology – Telecommunications bonding networks for buildings and other structures

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CONTENTS

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INFORMATION TECHNOLOGY –

TELECOMMUNICATIONS BONDING NETWORKS FOR BUILDINGS AND OTHER STRUCTURES

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International Standard ISO/IEC 30129 was prepared by subcommittee 25: Interconnection of information technology equipment, of ISO/IEC joint technical committee 1: Information technology.

This International Standard has been approved by vote of the member bodies, and the voting results may be obtained from the address given on the second title page.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

This International Standard specifies requirements and recommendations for the design and installation of connections (bonds) between various electrically conductive elements in buildings and other structures, during their construction or refurbishment, in which information technology (IT) and, more generally, telecommunications equipment is intended to be installed in order to

a) minimise the risk to the correct function of that equipment and interconnecting cabling from electrical hazards,

b) provide the telecommunications installation with a reliable signal reference – which may improve immunity from electromagnetic interference (EMI).

This International Standard

– specifies assessment criteria to determine the relevant bonding configurations that are appropriate,

– enables the implementation of any bonding configurations that may be necessary by means of either

  - the provision of a bonding network that utilises the existing protective bonding network for electrical safety, or

  - the provision of a dedicated bonding network for the telecommunications infrastructure.

This standard is intended for

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- building architects, owners and managers,
- designers and installers of electrical and telecommunications cabling installations.

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This International Standard is one of a number of documents prepared in support of international standards and technical reports for cabling design produced by ISO/IEC JTC 1/SC 25. Figure 1 shows the inter-relationship between these standards and technical reports.

Users of this standard should be familiar with all applicable cabling design and installation standards.

NOTE Telecommunications infrastructure affects raw material consumption. The infrastructure design and installation methods also influence product life and sustainability of electronic equipment life cycling. These aspects of telecommunications infrastructure impact our environment. Since building life cycles are typically planned for decades, technological electronic equipment upgrades are necessary. The telecommunications infrastructure design and installation process magnifies the need for sustainable infrastructures with respect to building life, electronic equipment life cycling and considerations of effects on environmental waste. Telecommunications designers are encouraged to research local building practices for a sustainable environment and conservation of fossil fuels as part of the design process.

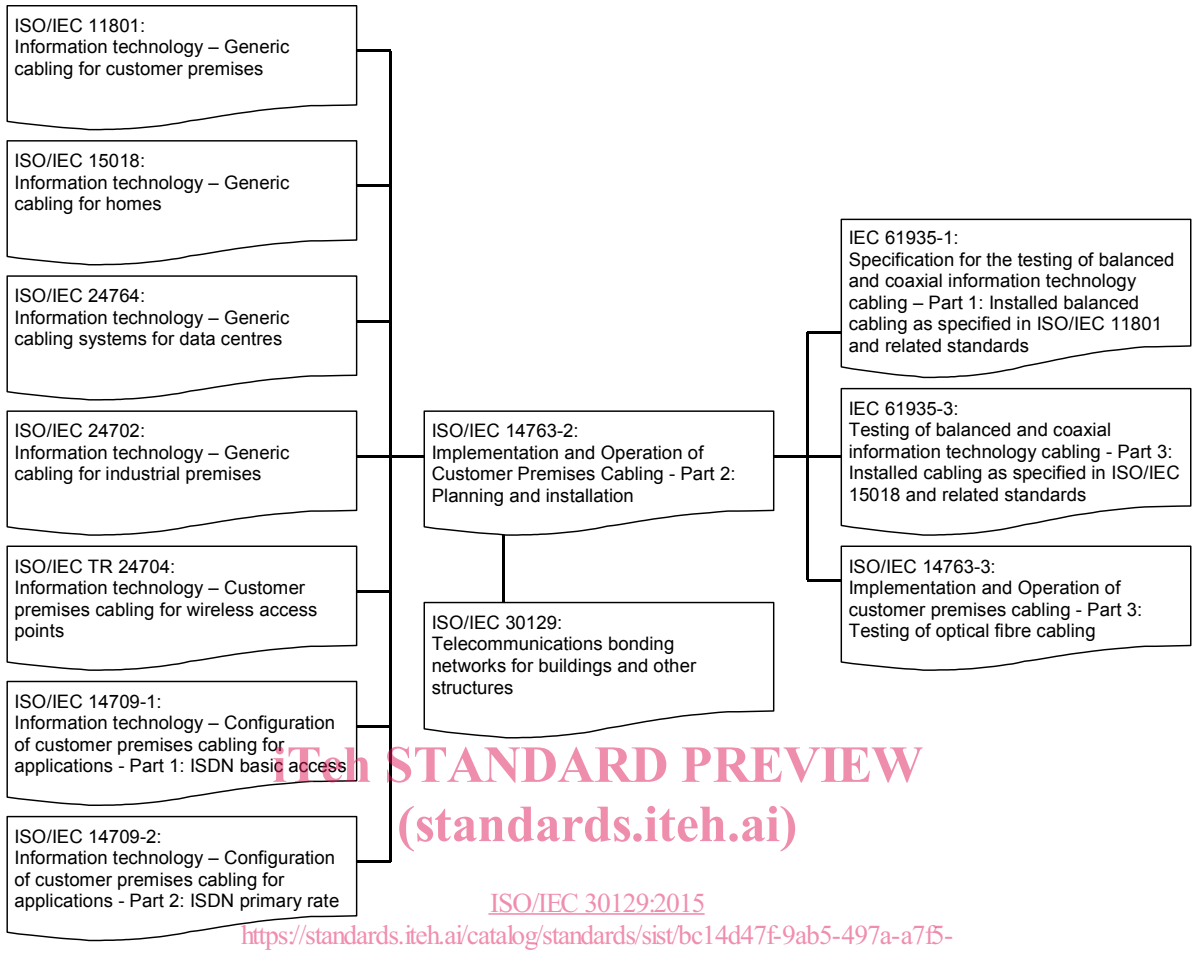

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Figure 1 – Schematic relationship between ISO/IEC 30129 and other relevant standards

INFORMATION TECHNOLOGY –

TELECOMMUNICATIONS BONDING NETWORKS FOR BUILDINGS AND OTHER STRUCTURES

1 Scope

This International Standard specifies requirements and recommendations for the design and installation of connections (bonds) between various electrically conductive elements in buildings and other structures, during their construction or refurbishment, in which information technology (IT) and, more generally, telecommunications equipment is intended to be installed in order to

a) minimise the risk to the correct function of that equipment and interconnecting cabling from electrical hazards,

b) provide the telecommunications installation with a reliable signal reference – which may improve immunity from electromagnetic interference (EMI).

The requirements of this International Standard are applicable to the buildings and other structures within premises addressed by ISO/IEC 14763-2 (e.g. residential, office, industrial and data centres) but information given in this International Standard may be of assistance for other types of buildings and structures.

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NOTE Telecommunications centres (operator buildings) are addressed by ITU-T K.27.

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This International Standard does not apply to power supply distribution of voltages over AC 1 000 V.

Electromagnetic compatibility (EMC) requirements and safety requirements for power supply installation are outside the scope of this International Standard and are covered by other standards and regulations. However, information given in this International Standard may be of assistance in meeting the requirements of these standards and regulations.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60364-4-41, *Low-voltage electrical installations – Part 4-41: Protection for safety – Protection against electric shock*

IEC 60364-4-44:2007, *Low-voltage electrical installations – Part 4-44: Protection for safety – Protection against voltage disturbances and electromagnetic disturbances*

IEC 60364-5-54, *Low-voltage electrical installations – Part 5-54: Selection and erection of electrical equipment – Earthing arrangements and protective conductors*

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

IEC 61140, *Protection against electric shock – Common aspects for installation and equipment*

ISO/IEC 14763-2:2012, *Information technology – Implementation and operation of customer premises cabling – Part 2: Planning and installation*

3 Terms, definitions and abbreviations

3.1 Terms and definitions

For the purposes of this document the following definitions apply in addition to those of ISO/IEC 14763-2. Alternatives to certain terms are provided in Annex C.

3.1.1
access provider
operator or another entity providing the means to enable external telecommunications services provision to a subscriber

3.1.2
asymmetric cabling
cabling within which the cable elements are asymmetric (unbalanced)

3.1.3
application
system, including its associated transmission method, which is supported by telecommunications cabling

[SOURCE: ISO/IEC 11801:2002, 3.1.2]

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3.1.4
backbone bonding conductor
telecommunications bonding connection which interconnects telecommunications bonding backbones

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3.1.5
balanced application
application designed and optimized to operate over symmetric cabling

3.1.6
common bonding network
set of interconnected conductive structures that combine the functions of a protective bonding network and a telecommunications bonding network

3.1.7
equipment bonding conductor
conductor that connects a protective bonding network to an item of telecommunications equipment

3.1.8
main earthing terminal
terminal or busbar which is part of the earthing arrangement of an installation and enabling the electric connection of a number of conductors for earthing purposes

[SOURCE: IEC 60050-826:2004, 826-13-15, modified – The terms "main earthing busbar main", "grounding terminal (US)" and "main grounding busbar (US)" have been deleted.]

3.1.9
mesh isolated bonding network
mesh bonding network with a single point of connection to either the protective bonding network or another isolated bonding network

3.1.10
mesh size
maximum length of conducting material between two adjacent connection points that create the grid of the telecommunications bonding network

3.1.11
primary bonding busbar
telecommunications bonding connection element, connected to the main earthing terminal, that is used to attach telecommunications bonding backbone conductors and equipment bonding conductors

3.1.12
protective bonding network
set of interconnected conductive elements to ensure electrical safety

Note 1 to entry: The protective bonding network meets the protective equipotential bonding system as defined in IEC 60050-195:1998, 195-02-23.

3.1.13
rack bonding conductor
conductor that connects a rack bonding busbar or items of equipment within a cabinet, frame or rack to the telecommunications bonding network within a local area

3.1.14
rack bonding busbar
attachment element within a cabinet, frame or rack or for multiple unit bonding conductors

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3.1.15
secondary bonding busbar
telecommunications bonding connection element for telecommunications systems and equipment in the area, served by a distributor

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3.1.16
system block
functional group of equipment depending in its operation and performance on its connection to the same system reference potential plane, inherent to a mesh bonding network

3.1.17
system reference potential plane
conductive solid plane, as an ideal goal in potential equalizing, that is approached in practice by horizontal or vertical meshes

Note 1 to entry: The mesh width thereof is adapted to the frequency range to be considered. Horizontal and vertical meshes may be interconnected to form a grid structure approximating a Faraday cage.

Note 2 to entry: The SRPP facilitates signalling with reference to a common potential.

3.1.18
symmetric cabling
screened or unscreened cabling within which the cable elements comprise balanced pairs or quads

EXAMPLE Twisted pairs or quads.

3.1.19
telecommunications bonding backbone
conductor installed within telecommunications pathways that interconnects a primary bonding busbar to its secondary bonding busbars within the building, and that is intended to minimise potential differences but not intended to serve as a conductor providing a fault current return path

3.1.20
telecommunications bonding conductor
conductor between the primary bonding busbar and the main earthing terminal

3.1.21
telecommunications bonding network
set of interconnected conductive elements that provide functional equipotential bonding for telecommunications equipment

3.1.22
telecommunications equipment bonding conductor
conductor that connects a primary or secondary bonding busbar to a supplementary bonding network, a rack bonding conductor or to an item of telecommunications equipment

3.1.23
telecommunications entrance facility
entrance point where the telecommunications facilities enter the building

Note 1 to entry: The telecommunications entrance facility may also include antenna cable entrances and electronic equipment serving telecommunications functions.

3.1.24
unbalanced application
application not optimised for transmission over symmetric cabling

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3.1.25
unit bonding conductor
conductor that connects the telecommunications equipment within a cabinet, frame or rack to the rack bonding busbar or to a rack bonding conductor

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3.2 Abbreviations

For the purposes of this document the abbreviations of ISO/IEC 14763-2 and the following apply.

a.c.	alternating current
BBC	Backbone Bonding Conductor
CBN	Common Bonding Network
d.c.	direct current
EMI	ElectroMagnetic Interference
IACS	International Annealed Copper Standard
MESH-BN	MESH Bonding Network
MESH-IBN	MESH Isolated Bonding Network
MET	Main Earthing Terminal
PBB	Primary Bonding Busbar
PBNC	Protective Bonding Network Conductor
RBB	Rack Bonding Busbar
RBC	Rack Bonding Conductor
SBB	Secondary Bonding Busbar
SBG	Supplementary Bonding Grid
SRPP	System Reference Potential Plane
SPC	Single Point Of Connection
TBB	Telecommunications Bonding Backbone

TBC	Telecommunications Bonding Conductor
TEBC	Telecommunications Equipment Bonding Conductor
TEF	Telecommunications Entrance Facility
TSP	Transient Suppression Plate
UBC	Unit Bonding Conductor

4 Conformance

For bonding infrastructures to conform to this International Standard

a) an assessment in accordance with Clause 6 shall be undertaken,

b) based on the results of the assessment any necessary bonding shall be implemented as follows

   1) the backbone and building entrance bonding shall either

      - use the protective bonding network provided that it delivers the performance required by the assessment of Clause 6, or
      - conform to the requirements of Clause 8 for a dedicated bonding system,

   2) the local bonding shall either

      - conform to Clause 9 in line with the requirements of the assessment of Clause 5, or
      - conform to the requirements of Clause 10 for a dedicated telecommunications bonding system in line with the requirements of the assessment of Clause 6,

   or

   3) a mesh bonding network in accordance with Clause 11,

c) the requirements of Clause 7 shall be applied to all telecommunications bonding networks implemented,

d) the cross-sectional areas of bonding conductors shall conform to the requirements of Clauses 7 to 11 as amended by the region-specific application of Annex B,

e) local regulations, including safety, shall be met.

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NOTE The proper implementation of the requirements of this International Standard assumes that electrical installations, protective bonding networks and protective measures against overvoltages are undertaken in accordance with the local regulations, as appropriate.

5 Overview of bonding networks

This International Standard assumes that buildings, or other structures, containing or intended to contain telecommunications equipment are of vertical extent (where a backbone connects zones of different floors) and/or horizontal extent (where a backbone connects multiple zones on a floor) and feature, as follows:

a) one or more entrance facilities,

b) one or more identifiable areas within each zone containing concentrations of telecommunications equipment (e.g. spaces associated with the generic cabling distributors of standards supported by ISO/IEC 14763-2),

c) areas in each zone within which telecommunications equipment is distributed (e.g. locations associated with the generic cabling outlets of standards supported by ISO/IEC 14763-2).

For the purposes of this International Standard

   1) the term “backbone” refers to connections between the areas of concentrations of telecommunications equipment and between any given area of concentration and a main earthing terminal (MET),

2) the term “local” refers to connections between a given area of concentration of telecommunications equipment and the area of distributed telecommunications equipment which it serves or other connections within that area.

This is shown schematically in Figure 2 for telecommunications equipment distribution and telecommunications bonding network terminology.

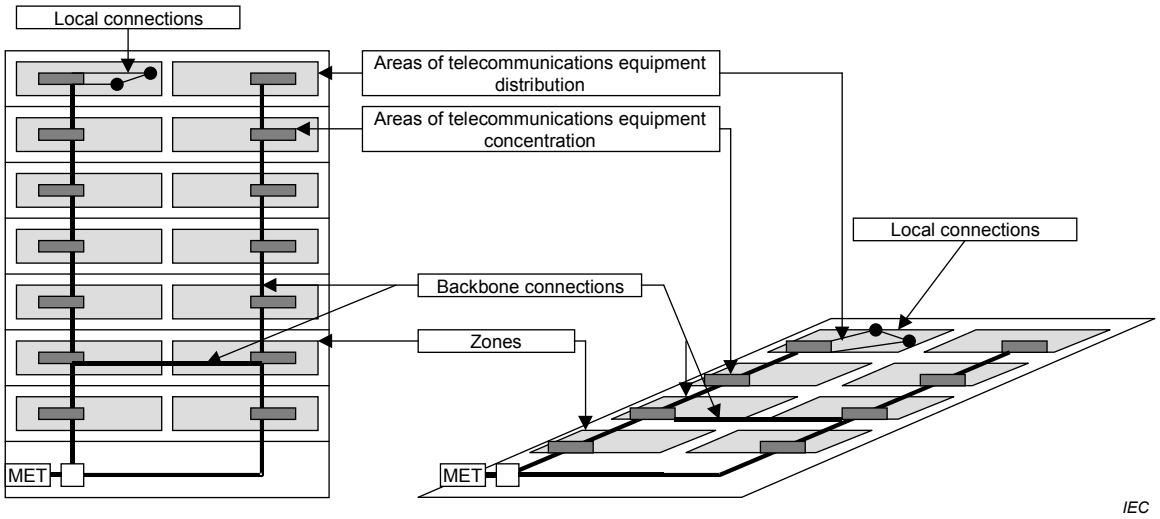

Figure 2 – Schematic of telecommunications equipment distribution and associated bonding connections

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The objective of this International Standard is, following the completion of the assessment of Clause 6, to ensure that backbone and local bonding networks

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- minimise d.c. and a.c. potential differences in order to reduce the risk to the correct function of telecommunications equipment interconnected by metallic cabling,
- have adequate a.c. and radio frequency performance to provide the telecommunications installation with a reliable signal reference and improved resistance to EMI.

It should be noted that failure to implement correct telecommunications bonding networks can act against this objective.

6 Selection of the telecommunications bonding network approach

6.1 Assessment of the impact of the telecommunications bonding network on the interconnection of telecommunications equipment

The requirements applied to a telecommunications bonding network depend upon the intended type of connectivity between the telecommunications equipment within and between the zones of Figure 2.

The mesh bonded network of Clause 11 is intended to support the most demanding requirements of both cabling media and the applications supported over those media. The mesh bonded network provides complete flexibility in relation to the types and locations of telecommunications equipment that may be installed (subject to the transmission performance limits of the applications when using the selected telecommunications cabling). This is further enhanced by the installation of power distribution systems conforming to TN-S as described in the IEC 60364 series of standards.

The installation of such a telecommunications bonding network is most easily implemented during construction or refurbishment of a building or structure. However, within an existing building