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Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

For national standards, comments will be reviewed by the relevant UK national committee and the resulting standards published as a British Standard.

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Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/ Figure/Table/Note	Type of comment	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	



JTC1-SC25/3153/CD

COMMITTEE DRAFT (CD)

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2023-07-28

SUPERSEDES DOCUMENTS:
JTC1-SC25/3152/RR

IEC ISO/IEC JTC 1/SC 25 : INTERCONNECTION OF INFORMATION TECHNOLOGY EQUIPMENT	
SECRETARIAT: Germany	SECRETARY: Mr Marco Peter
OF INTEREST TO THE FOLLOWING COMMITTEES:	PROPOSED HORIZONTAL STANDARD: ☐ Other TC/SCs are requested to indicate their interest, if any, in this CD to the secretary.
FUNCTIONS CONCERNED: ☐ EMC ☐ ENVIRONMENT ☐ QUALITY ASSURANCE ☐ SAFETY	

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Recipients of this document are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

TITLE:

Amendment 2 - Information technology - Telecommunications bonding networks for buildings and other structures

NOTE FROM TC/SC OFFICERS:

At this stage, a complete draft is being submitted to ease national commenting. The changes introduced will be presented in the Amendment format afterwards for formal voting.

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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 or telecommunications technology 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

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

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.

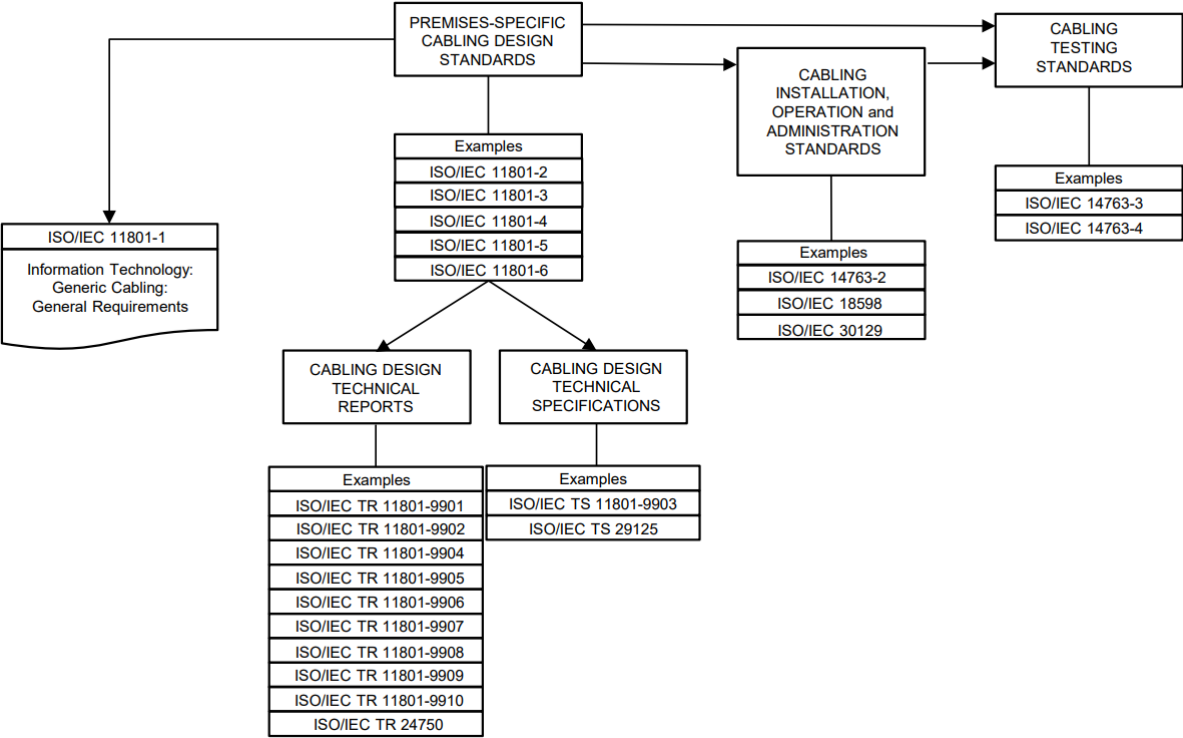


Figure 1 – Schematic relationship between ISO/IEC 30129 and other relevant standards

Editor's note: this diagram is taken from ISO/IEC11801-1 Amd 1 document JTC1-SC25_3126e_CD and where it has the title: Relationships between the generic cabling documents produced by ISO/IEC JTC1/SC25.

INFORMATION TECHNOLOGY –

TELECOMMUNICATIONS BONDING NETWORKS FOR BUILDINGS AND OTHER STRUCTURES

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 or telecommunications technology equipment is intended to be installed in order to

- a) minimise the d.c. and a.c. potential differences in order to reduce the risk of malfunction of that equipment and interconnecting cabling due to electromagnetic disturbance,
- 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.

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

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.

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*

IEC 61557-4, *Electrical safety in low voltage distribution systems up to 1 000 V a.c. and 1 500 V d.c. – Equipment for testing, measuring or monitoring of protective measures – Part 4. Resistance of earth connection and equipotential bonding*

IEC 61557-5, *Electrical safety in low voltage distribution systems up to 1 000 V a.c. and 1 500 V d.c. – Equipment for testing, measuring or monitoring of protective measures – Part 5. Resistance to earth*

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]

3.1.4

backbone bonding conductor

telecommunications bonding connection which interconnects telecommunications bonding backbones

3.1.5

balanced application

application designed and optimized to operate over symmetric cabling

3.1.6

bonding network BN

set of interconnected conductive structures that provides an “electromagnetic shield” for electronic systems at frequencies from direct current (DC) to low radio frequency (RF)

Note 1 to entry: This document describes four general types: Star, Ring, Local Mesh, Mesh.

3.1.7

common bonding network

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

3.1.8

equipment bonding conductor

conductor that connects a protective bonding network to telecommunications equipment

3.1.9**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.]

3.1.10**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

3.1.14**rack bonding busbar**

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

3.1.15**secondary bonding busbar**

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

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

304 EXAMPLE Twisted pairs or quads.

305 **3.1.19**

306 **telecommunications bonding backbone**

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

311 **3.1.20**

312 **telecommunications bonding conductor**

313 conductor between the primary bonding busbar and the main earthing terminal

314 **3.1.21**

315 **telecommunications bonding network**

316 set of interconnected conductive elements that provide functional equipotential bonding for
317 telecommunications equipment

318 **3.1.22**

319 **telecommunications equipment bonding conductor**

320 conductor that connects a primary or secondary bonding busbar to a supplementary bonding
321 network, a rack bonding conductor or to telecommunications equipment

322 **3.1.23**

323 **telecommunications entrance facility**

324 entrance point where the telecommunications facilities enter the building

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

327 **3.1.24**

328 **unbalanced application**

329 application not optimised for transmission over symmetric cabling

330 **3.1.25**

331 **unit bonding conductor**

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

334 **3.1.26**

335 **high frequency**

336 frequency of, or greater than, 1 MHz

337 **3.1.27**

338 **low frequency**

339 frequency of less than 1 MHz

340 **3.2 Abbreviations**

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

343	a.c.	alternating current
344	BBC	Backbone Bonding Conductor
345	CBN	Common Bonding Network
346	d.c.	direct current
347	EMI	ElectroMagnetic Interference
348	IACS	International Annealed Copper Standard

349	MESH-BN	MESH Bonding Network
350	MESH-IBN	MESH Isolated Bonding Network
351	MET	Main Earthing Terminal
352	PBB	Primary Bonding Busbar
353	PBNC	Protective Bonding Network Conductor
354	RBB	Rack Bonding Busbar
355	RBC	Rack Bonding Conductor
356	SBB	Secondary Bonding Busbar
357	SBG	Supplementary Bonding Grid
358	SRPP	System Reference Potential Plane
359	SPC	Single Point Of Connection
360	TBB	Telecommunications Bonding Backbone
361	TBC	Telecommunications Bonding Conductor
362	TEBC	Telecommunications Equipment Bonding Conductor
363	TEF	Telecommunications Entrance Facility
364	TSP	Transient Suppression Plate
365	UBC	Unit Bonding Conductor

366 Conformance

367 For bonding infrastructures to conform to this International Standard

- 368 a) an assessment in accordance with Clause 6 shall be undertaken,
- 369 b) based on the results of the assessment any necessary bonding shall be implemented as
- 370 follows
- 371 1) the backbone and building entrance bonding shall either
- 372 • use the protective bonding network provided that it delivers the performance required
 - 373 by the assessment of Clause 6, or
 - 374 • conform to the requirements of Clause 8 for a dedicated bonding system,
- 375 2) the local bonding shall either
- 376 • conform to Clause 9 in line with the requirements of the assessment of Clause 6, or
 - 377 • conform to the requirements of Clause 10 for a dedicated telecommunications
 - 378 bonding system in line with the requirements of the assessment of Clause 6,
- 379 or
- 380 3) a mesh bonding network in accordance with Clause 11,
- 381 c) the requirements of Clause 7 shall be applied to all telecommunications bonding networks
- 382 implemented,
- 383 d) the cross-sectional areas of bonding conductors shall conform to the requirements of
- 384 Clauses 7 to 11 as amended by the region-specific application of Annex B,
- 385 e) local regulations, including safety, shall be met.

386 NOTE The proper implementation of the requirements of this International Standard assumes that electrical

387 installations, protective bonding networks and protective measures against overvoltages are undertaken in

388 accordance with the local regulations, as appropriate. IEC 60364-4-44 contains additional information.

389

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.

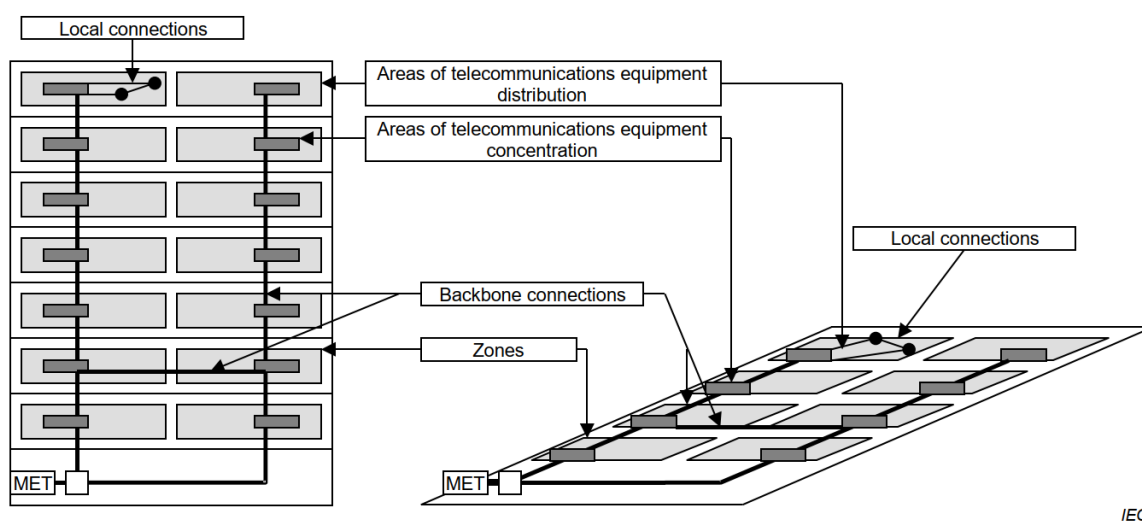


Figure 2 – Schematic of telecommunications equipment distribution and associated bonding connections

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

- 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.

Bonding networks are considered to be hierarchical. The functionality increases from star to ring to local mesh to mesh. The choice depends on the needs and the physical constraints of the buildings

Editor's note: the text above is FFS

Figure 3 shows examples of bonding network types. Requirement and descriptions are detailed in Clause 9 to Clause 11.

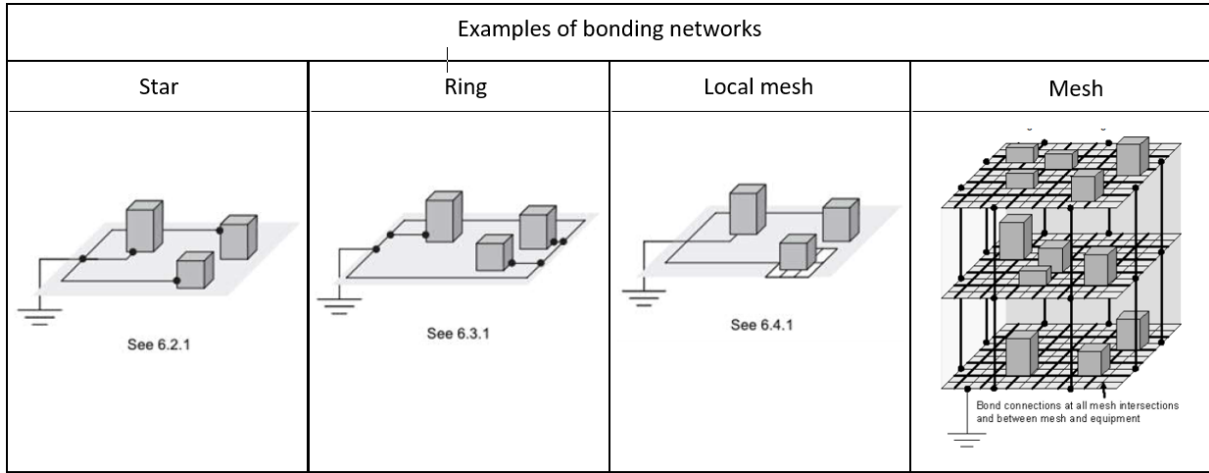


Figure 3 - examples of bonding network types

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 bonding network of Clause 11 provides the most effective bonding at high frequencies and can provide effective bonding at low frequencies. It is intended to support the most demanding requirements of both cabling media and the applications supported over those media (see Table 1). In addition, it provides the most 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).

The installation of such a telecommunications bonding network is most easily implemented during new construction or refurbishment of a building or structure.

Within an existing building or structure:

- a) the cost and complexity of installing a telecommunications bonding network that will support the requirements of applications operating over asymmetric cabling between any two points in a building may be prohibitive,
- b) the implementation of an all-optical network has no implications for the telecommunications bonding network but would substantially impact on the cost of transmission and terminal equipment and may not be viable for all intended applications.

Therefore an assessment has to be made based on a balance between complexity of the telecommunications bonding network and the type of cabling media and the application supported over those media between and within the zones described in Figure 2. This