

BS EN 50174-1:2009+A2:2014



BSI Standards Publication

Information technology — Cabling installation —

Part 1: Installation specification and
quality assurance

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National foreword

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The start and finish of text introduced or altered by amendment is indicated in the text by tags. Tags indicating changes to CENELEC text carry the number of the CENELEC amendment. For example, text altered by CENELEC amendment A1 is indicated by A1 A1.

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

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30 June 2011	Implementation of CENELEC amendment A1:2011
31 March 2015	Implementation of CENELEC amendment A2:2014, and in addition, subclause 4.3.3.1 corrected

English version

**Information technology -
Cabling installation -
Part 1: Installation specification and quality assurance**

Technologies de l'information -
Installation de câblages -
Partie 1: Spécification de l'installation
et assurance de la qualité

Informationstechnik -
Installation von
Kommunikationsverkabelung -
Teil 1: Installationsspezifikation
und Qualitätssicherung

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CENELEC

European Committee for Electrotechnical Standardization
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Foreword

This European Standard was prepared by the Technical Committee CENELEC TC 215, Electrotechnical aspects of telecommunication equipment.

The text of the draft was submitted to the formal vote and was approved by CENELEC as EN 50174-1 on 2009-05-01.

This European Standard supersedes EN 50174-1:2000.

The following dates were fixed:

- latest date by which the EN has to be implemented
at national level by publication of an identical
national standard or by endorsement (dop) 2010-05-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2012-05-01

EN 50174 comprises three parts. All three parts support the specification, implementation and operation of information technology cabling. There are specific requirements for cabling systems that are in accordance with the design requirements of the EN 50173 series. However, the three parts also apply to cabling systems of any design including those in accordance with standards such as EN 50098-1 or EN 50098-2.

This part, EN 50174-1, is concerned with specification, quality assurance, documentation and administration of information technology cabling to be installed, together with its subsequent operation and maintenance. It sets out the responsibilities of information technology cabling installers and premises owners or appointed representatives separately, and is intended to be referenced in relevant contracts.

It does not cover those aspects of installation associated with the transmission of signals in free space between transmitters, receivers or their associated antenna systems (e.g. wireless, radio, microwave or satellite).

Foreword to amendment A1

This amendment to the European Standard EN 50174-1:2009 was prepared by the Technical Committee CENELEC TC 215, Electrotechnical aspects of telecommunication equipment.

The text of the draft was submitted to the formal vote and was approved by CENELEC as Amendment A1 to EN 50174-1:2009 on 2011-01-01.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN and CENELEC shall not be held responsible for identifying any or all such patent rights.

The following dates were fixed:

- latest date by which the amendment has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2012-01-01
- latest date by which the national standards conflicting with the amendment have to be withdrawn (dow) 2014-01-01

This amendment comes with

- a new normative Annex E on sampling plans and marginal results;
- simplified administration requirements (see 4.5.2), simplified complexity installation and operational levels (see 6.2) and simplified minimum requirements for technical specifications and quality plans (see Annex A);
- some technical and editorial changes to Clauses 4 and 5.

Foreword to amendment A2

This document (EN 50174-1:2009/A2:2014) has been prepared by CLC/TC 215 "Electrotechnical aspects of telecommunication equipment".

The following dates are fixed:

- latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2015-08-18
- latest date by which the national standards conflicting with this document have to be withdrawn (dow) 2017-08-18

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

This Amendment covers

- some technical and editorial changes to the Introduction, Clauses 3 and 4.
- a new Annex F.

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Introduction

The importance of services delivered by information technology cabling infrastructure is similar to that of utilities such as heating, lighting and electricity supplies. As with those utilities, interruptions to service can have a serious impact. Poor quality of service due to lack of planning, use of inappropriate components, incorrect installation, poor administration or inadequate support can threaten an organisation's effectiveness.

There are four phases in the successful implementation of information technology cabling. These are:

- a) design;
- b) specification – the detailed requirement for the cabling, including the planning of its accommodation and associated building services addressing specific environments (e.g. electromagnetic) together with the quality assurance requirements to be applied;
- c) installation – in accordance with the requirements of the specification;
- d) operation – the management of connectivity and the maintenance of transmission performance during the life of the cabling.

This European Standard is in three parts and addresses the specification, installation and operational aspects. The EN 50173 series and other application standards cover design issues.

EN 50174-1 is used during the specification phase. It addresses the:

- installation specification, quality assurance documentation and procedures;
- documentation and administration;
- operation and maintenance.

This part, EN 50174-2 and EN 50174-3 are intended to be used by the personnel directly involved in the planning aspects (of the specification phase) and installation phase. EN 50174-2 is applicable inside buildings and EN 50174-3 is applicable outside buildings.

This European Standard is also relevant to:

- architects, building designers and builders;
- main contractors;
- designers, suppliers, installers, inspectors (auditors), maintainers and owners of information technology cabling;
- public network providers and local service providers;
- end users.

The requirements and recommendations of Clause 4 are primarily for owners of premises housing information technology systems. The owners may delegate selected responsibilities to designers, specifiers, operators and maintainers of installed information technology cabling.

The requirements and recommendations of Clause 5 are primarily for the installers of information technology cabling.

Figure 1 and Table 1 show the schematic and contextual relationships between the standards produced by CLC/TC 215 for information technology cabling, namely:

- 1) this and other parts of the EN 50174 series;
- 2) generic cabling design (EN 50173 series);
- 3) application dependent cabling design (e.g. EN 50098 series);
- 4) testing of installed cabling (EN 50346);
- 5) equipotential bonding requirements (EN 50310).

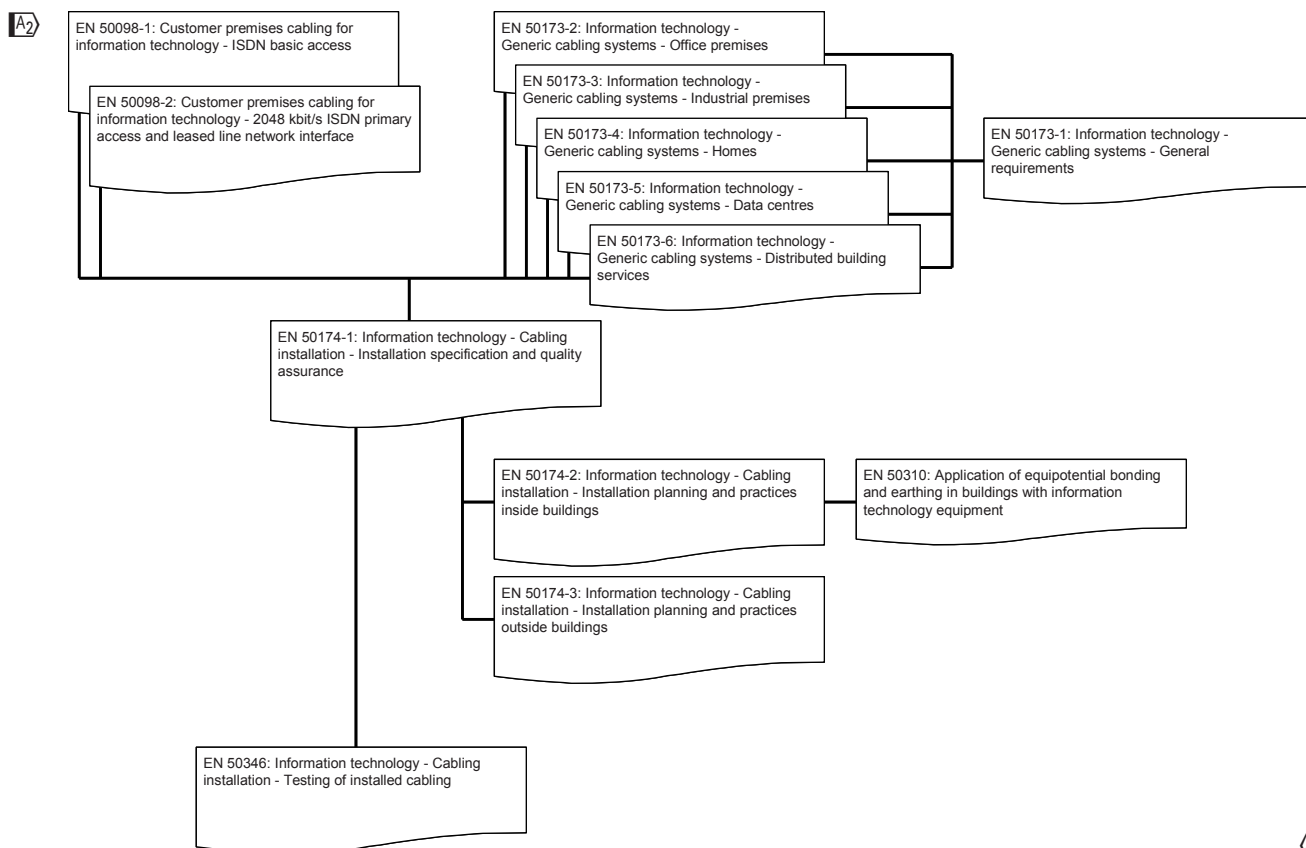


Figure 1 – Schematic relationship between the EN 50174 series and other relevant standards

Table 1 – Contextual relationship between EN 50174 series and other standards relevant for information technology cabling systems

Building design phase	Generic cabling design phase	Specification phase	Installation phase	Operation phase
EN 50310 6. Bonding networks	EN 50173 series except EN 50173-4 4: Structure 5: Channel performance 7: Cable requirements 8: Connecting hardware requirements 9: Requirements for cords and jumpers A: Link performance limits and EN 50173-4 4 and 5: Structure 6: Channel performance 8: Cable requirements 9: Connecting hardware requirements 10: Requirements for cords and jumpers A: Link performance limits	EN 50174-1 4: Requirements for specifying installations of information technology cabling 5: Requirements for installers of information technology cabling		EN 50174-1 4: Requirements for specifying installations of information technology cabling
		Planning phase		
		EN 50174-2 4: Requirements for planning installations of information technology cabling 6: Segregation of metallic information technology cabling and power supply cabling 7: Electricity distribution systems and lightning protection and EN 50174-3 and (for equipotential bonding) EN 50310		
		and EN 50174-3 and (for equipotential bonding) EN 50310 and EN 50346 4: General requirements 5: Test parameters for balanced cabling 6: Test parameters for optical fibre cabling	EN 50174-2 5: Requirements for the installation of information technology cabling 6: Segregation of metallic and power supply cabling 8: Office (commercial) premises 9: Industrial premises 10: Homes 11: Data centres and EN 50174-3 and (for equipotential bonding) EN 50310 and EN 50346 4: General requirements 5: Test parameters for balanced cabling 6: Test parameters for optical fibre cabling	

A1

1 Scope and conformance

1.1 Scope

This European Standard specifies requirements for the following aspects of information technology cabling:

- a) installation specification, quality assurance documentation and procedures;
- b) documentation and administration;
- c) operation and maintenance.

This European Standard is applicable to all types of information technology cabling including generic cabling systems designed in accordance with the EN 50173 series.

Safety (electrical safety and protection, optical power, fire, etc.) and electromagnetic compatibility (EMC) requirements are outside the scope of this European Standard and are covered by other standards and regulations. However, information given in this European Standard may be of assistance in meeting these standards and regulations.

1.2 Conformance

For a cabling installation to conform to this European Standard:

- a) the specification of the installation shall meet the requirements of Clause 4;

NOTE The requirements and recommendations of Clause 4 are primarily for owners of premises housing information technology systems. The owners may delegate selected responsibilities to designers, specifiers, operators and maintainers of installed information technology cabling. The party responsible for demonstrating conformance should be clearly stated in the appropriate section of the documentation.

- b) the installer shall meet the requirements of Clause 5;
- c) the equipotential bonding system within the premises shall be in accordance with EN 50310;
- d) where a lightning protection system is required, it shall conform to the “integrated lightning protection system” according to EN 62305-4;
- e) other lightning protection systems, including the “isolated lightning protection system” according to EN 62305-3 are allowed provided that specific restrictions are applied both to the implementation of the information technology cabling and the requirements of EN 50310 as agreed between the planners of the lightning protection system and the information technology cabling;
-  f) local regulations, including safety, that are more stringent than the requirements listed in a) to e) shall be met. 

2 Normative references

The following referenced documents are indispensable for the application 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.

 EN 50173-1:2011, *Information technology – Generic cabling systems – Part 1: General requirements* 

EN 50173-2, *Information technology – Generic cabling systems – Part 2: Office premises*

EN 50173-3, *Information technology – Generic cabling systems – Part 3: Industrial premises*

EN 50173-4, *Information technology – Generic cabling systems – Part 4: Homes*

EN 50173-5, *Information technology – Generic cabling systems – Part 5: Data centres*

EN 50174-2, *Information technology – Cabling installation – Part 2: Installation planning and practices inside buildings*

EN 50174-3, *Information technology – Cabling installation – Part 3: Installation planning and practices outside buildings*

EN 50310, *Application of equipotential bonding and earthing in buildings with information technology equipment*

EN 50346, *Information technology – Cabling installation – Testing of installed cabling*

EN 60332-1-2, *Tests on electric and optical fibre cables under fire conditions – Part 1-2: Test for vertical flame propagation for a single insulated wire or cable – Procedure for 1 kW pre-mixed flame* (IEC 60332-1-2)

^[A1] EN 61935-1, *Specification for the testing of balanced and coaxial information technology cabling – Part 1: Installed balanced cabling as specified in the standards series EN 50173* (IEC 61935-1:2009, mod.) ^[A1]

EN 62305-4, *Protection against lightning – Part 4: Electrical and electronic systems within structures* (IEC 62305-4)

HD 384/HD 60364 (series), *Low-voltage electrical installations* (IEC 60364 series, mod.)

IEC 60050-151:2001, *International Electrotechnical Vocabulary – Chapter 151: Electrical and magnetic devices*

IEC 60050-161:1990, *International Electrotechnical Vocabulary – Chapter 161: Electromagnetic compatibility*

^[A1] ISO/IEC TR 14763-2-11¹⁾, *Information technology – Implementation and operation of customer premises cabling – Part 2-1: Planning and installation of copper cabling – Identifiers within administration systems* ^[A1]

3 Terms, definitions and abbreviations

3.1 Terms and definitions

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

Where the cabling is designed in accordance with standards in the EN 50173 series, the additional definitions of those standards are applicable.

NOTE As far as possible definitions of series IEC 60050 have been used; reference to these standards is indicated in square brackets.

3.1.1

acceptance test of installed cabling

contractual test to prove to the customer that the installed cabling meets specific conditions of its specification

[derived from IEC 60050-151:2001, 151-16-23]

3.1.2

array connector

an optical fibre connector containing a single ferrule with multiple terminated fibres arranged in a line or a series of lines

^[A2] 3.1.3

automated infrastructure management system

integrated hardware and software which automatically records the nature of, and identifies changes to, connections between the cabling infrastructure and of the interconnected transmission and terminal equipment ^[A2]

^[A1] 3.1.4

building entrance facility

facility that provides all necessary mechanical and electrical services for the entry of telecommunications cables into a building and which may allow for transition from external to internal cable

[EN 50173-1:2011] ^[A1]

^[A1] 1) Under development. ^[A1]

3.1.5

cabinet

enclosed construction for housing closures and other information technology equipment

3.1.6

cable element

smallest construction unit in a cable

NOTE 1 A cable element may have a screen.

NOTE 2 A pair, a quad, a single isolated lead with coaxial screen and a single optical fibre are examples of a cable element.

[EN 50173-1:2011] 

3.1.7

cable management system

system used for the support and/or containment, retention, protection of all types of cables, information and communication lines, electrical power distribution conductors and their associated accessories (includes ducts and tubes housing, or intended to house, blown information technology cables and/or cable elements)

3.1.8

cabling component

any product associated with the cabling installation including cables, connecting hardware, closures, cabinets, frames, racks and pathway systems together with components used to provide earth connections for the cabling installation

3.1.9

closure

fixture or fitting of either open or closed construction intended to contain connecting hardware

3.1.10

discoverable equipment

equipment with a network address

Note 1 to entry: Discoverable equipment can be treated as non-discoverable equipment per end user choice. 

3.1.11

draw-box

space in a pathway that allows the routing of cables during the cable installation process

3.1.12

electrostatic discharge

transfer of electric charge between bodies of different electrostatic potential in proximity or through direct contact

[IEC 60050-161:1990, 161-01-22]

3.1.13

electromagnetic disturbance

any electromagnetic phenomenon which may degrade the performance of a device, equipment or system, or adversely affect living or inert matter

NOTE An electromagnetic disturbance may be an electromagnetic noise, an unwanted signal or a change in the propagation medium itself.

[IEC 60050-161:1990, 161-01-05]

3.1.14

external fire barrier

a boundary, designated by local fire authorities, that demarcates the extent of the fire zones or compartments of a building 

A1 3.1.15

fire barrier

fire compartment boundary with appropriate levels of fire performance in order to prevent the spread of fire and its effluent and minimize the extent of loss

3.1.16

fire-stop materials

sealing products that, at all times, take up imperfections of fit or design tolerance between the fire resisting fixed elements of a building and which provide the same fire performance as the fixed elements in order to restrict the passage of fire and smoke

3.1.17

fire-stopping techniques

processes, products and materials that reinstate the original fire rating of a fire barrier

3.1.18

frame

open construction, typically wall-mounted, for housing closures and other information technology equipment

3.1.19

identifier

unique item of information to distinguish a specific component of the cabling installation

3.1.20

information technology

telecommunications

branch of technology concerned with the transmission, emission and reception of signs, signals, writing, images and sounds; that is, information of any nature by cable, radio, optical or other electromagnetic systems

NOTE The term telecommunications has no legal meaning when used in this document.

[EN 50173-1:2011]

3.1.21

information technology equipment

active or passive equipment necessary to deliver a specific application

NOTE Examples include hubs, switches, routers, adapters.

3.1.22

installer

person installing cabling components

NOTE No design functions are assumed.

3.1.23

jumper

one or more cable elements without connectors used to make a connection between terminated cables

3.1.24

label

means of marking a specific component of the information technology infrastructure with its identifier and (optionally) other information and intended to be fixed to, or be part of, the component

3.1.25

minimum bend radius during installation

minimum radius as specified by the cable manufacturer, supplier or in accordance with the relevant product standard to which a cable or cable element is allowed to be subjected during installation



3.1.26

minimum bend radius during operation – static

minimum radius as specified by the cable manufacturer, supplier or in accordance with the relevant product standard to which a cable or cable element is allowed to be subjected following installation and fixed in its final operating position

3.1.27

minimum bend radius during operation – dynamic

minimum radius as specified by the cable manufacturer, supplier or in accordance with the relevant product standard to which a cable or cable element is allowed to be subjected under conditions where the cable or cable element is subject to movement

3.1.28

pathway

defined route for cables between termination points

3.1.29

pathway system

cable management system, or other area or volume defined by markings

3.1.30

power supply cabling

cabling whose primary purpose is the supply of electrical power

3.1.31

rack

open construction, typically self-supporting and floor-mounted, for housing closures and other information technology equipment

3.1.32

record

collection of information about, or related to, a specific element of the information technology infrastructure

3.1.33

scope of work

the detailed definition of the tasks involved in an installation or particular phase of an installation

3.1.34

service loop

excess length of cable or cable element(s)

3.1.35

space

specified volume within premises allocated to information technology cabling infrastructure (e.g. entrance facilities, functional elements in accordance with EN 50173 series standards)

NOTE Examples include rooms, maintenance holes or part thereof, housing closures and/or other information technology equipment.

3.1.36

termination point

free or fixed connectors (e.g. plugs or sockets) fitted to an installed cable

3.1.37

transition assembly

assembly of optical fibres and connectors, with an array connector on one end and simplex or duplex connectors on other end

3.2 Abbreviations

For the purposes of this document, the following abbreviations apply.

Where the cabling is designed in accordance with standards in the EN 50173 series, the additional abbreviations of those standards are applicable.

 BEF	building entrance facility 
ENI	External network interface
ESD	Electrostatic discharge
 AIM	Automated infrastructure management
MAC	Move, add, change 

4 Requirements for specifying installations of information technology cabling

4.1 Documentation

4.1.1 Installation specification

4.1.1.1 Requirements

An installation specification shall be prepared in accordance with the requirements of this clause. The installation specification shall be agreed with the installer prior to the commencement of the installation.

The installation specification shall comprise:

- a) the technical specification (see 4.1.2);
- b) the scope of work (4.1.3).

The installation specification shall detail how the following have been taken into account:

-  1) other building services such as power supply distribution and earthing systems; 
- 2) circuits for smoke/fire detection and associated controls;
 - 3) heating, ventilation and air conditioning (HVAC) infrastructures;
 - 4) piping systems (water supply and waste, fire suppression);
 - 5) other relevant infrastructures.

The installation specification shall detail the applicable legislation, regulations and compliance statements including:

- building regulations relating to the installation;
- specific site regulations;
- safe working practices;
- external network service protection;
- contractors' authorization.

The installation specification shall detail the site contacts with responsibilities for:

- operational requirements;
- site information (including access and applicable restrictions, knowledge of relevant hazardous areas);
- technical requirements;
- documentation of existing cabling, if relevant;
- compatibility of existing information technology cabling components;
- items to be issued to the information technology cabling installer by, or on behalf of the premises owner or appointed representative;
- storage of materials;
- installation of cabling by a third party;
- main contractor and/or sub-contractors;
- transfer of property and/or responsibility.

4.1.1.2 Recommendations

The installation specification should reflect predictable expansion to the cabling system, whether from the need to support additional users or increases in quantity or type of applications, with reference to:

- a) pathways and pathway systems;
- b) cabinets, frames and racks;
- c) termination points;
- A1 d) the power supply system. A1

The quantity of termination points should reflect the predicted requirements over the intended life of information technology cabling.

The installation specification should contain the elements of the information technology strategy that include details of:

- 1) the application(s) to be supported by the installed cabling highlighting, where relevant, current and future requirements for compliance with information technology standards;
- 2) external network service provision and its interface(s) to the information technology cabling (see 4.4);
- 3) resilience planning;
- 4) security requirements/access restrictions.

4.1.2 Technical specification

4.1.2.1 General

The requirements of 4.1.2.2 and 4.1.2.3 apply in all cases. The minimum requirements for the development of a technical specification, based upon the installation complexity level of Clause 6, are detailed in Annex A.

4.1.2.2 Safety

The technical specification shall (with reference to EN 50174-2 and EN 50174-3):

- a) identify and classify any hazardous areas within the pathways and at termination points;
- b) detail the boundaries of hazardous, or potentially hazardous areas.

4.1.2.3 Performance and configuration

4.1.2.3.1 Requirements

The technical specification shall detail the required transmission performance of the cabling to be installed:

- a) when subject to the defined operational environment (see 4.1.2.5);
- b) in conjunction with existing cabling.

NOTE The required transmission performance may be achieved by the selection of components with appropriate environmental performance or by mitigation products or techniques that modify the defined environment including:

- isolation from the defined environment (by means of protection/segregation);
- separation from the defined environment.

The technical specification shall detail any mitigation products or techniques necessary to allow the components selected to be installed and operate as specified when subjected to the defined environmental conditions.

The technical specification shall detail the:

- 1) presentation of cable elements at interfaces to the installed cabling;
- 2) treatment of cable elements not terminated within connecting hardware.

NOTE 1 Annex B contains requirements and recommendations for the maintenance of polarity within cabling terminated with connecting hardware housing multiple optical fibres.

NOTE 2 Annex C provides information about possible connections between the wires and the pins of information technology outlets within generic cabling systems in accordance with the EN 50173 series. The same set of combinations between wires and pins should be used throughout the whole cabling installation.

The technical specification shall contain the requirements for:

- the pathways, pathway systems, cables, cabinets, frames, racks, closures and termination points (see 4.3);
- installation accessories and processes to be used during the installation;
- the protective earthing, functional earthing and equipotential bonding of cabling components and accessories. See HD 384/HD 60364 series, EN 50174-2, EN 50174-3 and EN 50310.

4.1.2.3.2 Recommendations

The technical specification should reflect the recommendations of Annex D where multiple applications are to be transmitted within a single cable.

4.1.2.4 Ancillary information

4.1.2.4.1 Requirements

The technical specification shall detail:

- a) the requirements for the operational lifetime of the cabling installation;
- b) any measures required to prevent unauthorised access to pathways, pathway systems, cabinets, frames, racks, closures and cords;
- c) the location of, and requirements for, any relevant external network interfaces (ENIs) (see 4.4);
- d) infrastructure requirements necessary to support planned extensions of the installation;
- e) the requirements to maintain supply of the cabling components or suitable alternatives during maintenance, repair and extensions throughout the operational lifetime of the installed cabling.

The technical specification shall define the:

- 1) level of administration system to be applied to the cabling infrastructure (see 4.5.2);
- 2) range of documentation to be supplied by the installer including any requirements to link records to each other and to other building services records;

- 3) format of the documentation (e.g. to match the administration system);
- 4) labelling to be undertaken by the installer (see EN 50174-2 and EN 50174-3);
- 5) specification of labels (as a minimum, meeting the requirements of 5.2.5);
- 6) requirements for inspection and testing;
- 7) format of inspection and test documentation;
- 8) requirements for acceptance of the installation;
- 9) format of acceptance test result documentation (e.g. to match the administration system) together with other information relating to the test e.g. type of tester used, date of test, operator, termination point identifier, remedial action taken in the event of failed test, re-test results.

4.1.2.4.2 Recommendations

The format of the final cabling documentation should facilitate changes to be made to the installed cabling throughout its intended operational life.

Where used, drawings should use commonly understood, unique and unambiguous symbols (an example of such a system is IEC 60617).

4.1.2.5 Environmental conditions

4.1.2.5.1 Requirements

The technical specification shall detail, where known, the intended installation and operational environmental conditions taking into account:

- a) mechanical effects:
 - shock/bump, vibration, tensile force, crush, impact, bending and flexing;
- b) ingress of contaminants:
 - immersion;
- c) climatic and chemical effects:
 - temperature range, rate of change of temperature;
 - humidity range including condensation and icing effects;
 - solar radiation;
 - liquid or gaseous chemical pollution;
- d) electromagnetic effects.

NOTE The list above is based on the environmental classification of EN 50173-1.

In addition, the technical specification shall detail, where known, the intended installation and operational environmental conditions taking into account:

- 1) atmospheric pressure;
- 2) biological attack (e.g. mould or fungal growth);
- 3) physical damage (accidental or malicious) including damage caused by animals;
- 4) presence, or potential presence, of hazards (such as contaminating, toxic or explosive materials);
- 5) the movement of air (e.g. caused by fans, heating and ventilation systems);
- 6) wind effects;
- 7) impact of both direct lightning strike and lightning induced overvoltages.

NOTE A number of standards exist for the classification of environments relevant to information technology components and equipment. Reference should be made to EN 60721 series, HD 60364-1:2008, EN 300 019-1-1 (for storage) and EN 300 019-1-3 (for operation).