BS 6701:2016

BSI Standards Publication

Telecommunications equipment and telecommunications cabling – Specification for installation, operation and maintenance

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Publishing and copyright information

Published by BSI Standards Limited 2016

ISBN 978 0 580 93144 4

ICS 33.020

The following BSI references relate to the work on this document:
Committee reference TCT/7/2
Draft for comment 16/30336625 DC

Publication history

First published as BS 6701-1 April 1986
Second edition, July 1990
First published as BS 6701 November 1994
Second edition, May 2004
Third edition, March 2010
Fourth (present) edition, July 2016

Amendments issued since publication

Date	Text affected

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Foreword

Publishing information

This British Standard is published by BSI Standards Limited, under licence from The British Standards Institution, and came into effect on 31 July 2016. It was prepared by Subcommittee TCT/7/2, *Telecommunications; Installation requirements: Cabling installation and UK implementation*, under the authority of Technical Committee TCT/7, *Telecommunications – Installation requirements*. A list of organizations represented on these committees can be obtained on request to their secretary.

Supersession

This British Standard supersedes BS 6701:2010, which is withdrawn.

Information about this document

This is a full revision of BS 6701 and has been published to support BS EN 50174-1:2009+A2:2014, BS EN 50174-2:2009+A2:2014 and BS EN 50174-3:2013 which contain text that was previously in BS 6701:2010. It should be read in conjunction with the BS EN 50174 series of standards. It also contains information regarding the use of telecommunications cabling for the powering of telecommunications and other equipment.

Unless otherwise stated in this standard, voltages and currents are r.m.s. with a nominal frequency of 50 Hz.

Hazard warnings

WARNING. This British Standard calls for the use of substances and/or procedures that can be injurious to health if adequate precautions are not taken. It refers only to technical suitability and does not absolve the user from legal obligations relating to health and safety at any stage.

Use of this document

It has been assumed in the preparation of this British Standard that the execution of its provisions will be entrusted to appropriately qualified and experienced people, for whose use it has been produced.

The requirements contained within Clause **4** are primarily for owners of premises housing telecommunications systems, who may delegate selected responsibilities to designers, specifiers, operators and maintainers of installed telecommunications equipment and telecommunications cabling.

The requirements contained within Clause **5** are primarily for the installers of telecommunications equipment and telecommunications cabling.

Users of this British Standard should ensure that they are reading the clause appropriate to their responsibilities.

Presentational conventions

The provisions of this standard are presented in roman (i.e. upright) type. Its requirements are expressed in sentences in which the principal auxiliary verb is "shall".

Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.

Contractual and legal considerations

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

In particular, attention is drawn to the following statutory regulations.

Electromagnetic Compatibility Regulations 2006 [1]

Electrical Equipment (Safety) Regulations 1994 [2]

Provision and Use of Work Equipment Regulations 1998 [3]

Work at Height Regulations 2005, as amended [4]

1 Scope

This British Standard specifies requirements for the installation, operation, administration and maintenance of telecommunications equipment and telecommunications cabling, other than cabling specified in BS EN 50174. It also specifies requirements beyond the scope of the BS EN 50174 series of standards for telecommunications equipment.

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

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.

BS 5306 (all parts), *Code of practice for fire extinguishing installations and equipment on premises*

BS 7671:2008+A3:2015, *Requirements for electrical installations – IET Wiring Regulations – Seventeenth edition*

BS EN 50174-1:2009+A2:2014, *Information technology – Cabling installation – Part 1: Installation specification and quality assurance*

BS EN 50174-2:2009+A2:2014*, Information technology – Cabling installation – Part 2: Installation planning and practices inside buildings*

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

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

BS EN 60079-14, *Explosive atmospheres – Part 14: Electrical installations design, selection and erection*

BS EN 60079-17, *Explosive atmospheres – Part 17: Electrical installations inspection and maintenance*

BS EN 60446, *Basic and safety principles for man-machine interface, marking and identification – Identification of conductors by colours or alphanumerics*

BS EN 60825-2, *Safety of laser products – Part 2: Safety of optical fibre communication systems (OFCS)*

BS EN 61241-14, *Electrical apparatus for use in the presence of combustible dust – Part 14: Selection and installation*

BS EN 61241-17, *Electrical apparatus for use in the presence of combustible dust – Part 17: Inspection and maintenance of electrical installations in hazardous areas (other than mines)*

BS EN 61340-5-1, *Electrostatics – Part 5-1: Protection of electronic devices from electrostatic phenomena – General requirements*

HD 60364-5-54:2007, *Low voltage electrical installations – Part 5-54: Selection and erection of electrical equipment – Earthing arrangement, protective conductors and protective bonding conductors*

PD CLC/TR 50404, *Electrostatics – Code of practice for the avoidance of hazards due to static electricity*

PD CLC/TR 50426, *Assessment of inadvertent initiation of bridge wire electro-explosive devices by radio-frequency radiation – Guide*

PD CLC/TR 50427, *Assessment of inadvertent ignition of flammable atmospheres by radio-frequency radiation – Guide*

3 Terms, definitions and abbreviations

3.1 Terms and definitions

For the purposes of this British Standard, the definitions given in BS EN 50174 (all parts) and the following apply.

3.1.1 electricity supply cabling

system of cables and connecting hardware intended to provide an electricity supply whether or not connected to an electricity supply at the time of installation of any telecommunications equipment and/or cabling

3.1.2 extra-low voltage

voltage not exceeding 50 V a.c. or 120 V ripple-free d.c., whether between conductors or to earth

3.1.3 low voltage

voltage exceeding extra-low voltage but not exceeding 1 000 V a.c. or 1 500 V d.c. between conductors, or 600 V a.c. or 900 V d.c. between conductors and earth

3.1.4 telecommunications cabling

system of cables, cords and connecting hardware intended to support the operation of information technology equipment as, or as part of, a telecommunications system

3.1.5 telecommunications equipment

means of delivering a specific telecommunications application and its associated transmission method over telecommunications cabling

3.1.6 telecommunications system

combination of telecommunications equipment and telecommunications cabling providing distribution of telecommunications applications within and/or between premises

NOTE 1 Examples of telecommunications applications are those which perform actions such as processing, displaying or transferring information including numerical data, text, audio, still or moving images together with any combination of these. Telecommunications applications are also used to control machinery, building facilities or other non-telecommunications equipment.

NOTE 2 In addition to telecommunications cabling, telecommunications systems also use waveguides (including optical waveguides) and radio transmission.

3.2 Abbreviations

For the purposes of this British Standard, the abbreviations given in BS EN 50174 (all parts) and the following apply.

LV	low voltage
MET	main earthing terminal
FE	functional earth
PE	protective earth

4 Requirements for owners of premises housing telecommunications systems

NOTE The owners of premises housing telecommunications systems may delegate the responsibilities specified in this clause to authorized persons such as designers, specifiers, operators and maintainers of the telecommunications systems.

4.1 General

4.1.1 Compliance with the BS EN 50174 series of standards

All telecommunications cabling and telecommunications equipment shall meet all the requirements of the BS EN 50174 series of standards.

4.1.2 Documentation and administration

NOTE Attention is drawn to the Construction (Design and Management) Regulations 2015 [5] in respect of the identification, classification and recording of hazards on the premises.

The documentation requirements of BS EN 50174-1:2009+A2:2014, Clause **4** shall be applied to telecommunications equipment.

The location of the MET shall be documented and the information shall be available for inspection.

4.1.3 Power supplies

An electricity supply that meets the power consumption requirements of the telecommunications equipment shall be provided.

4.1.4 Fire extinguishing systems

Where a gaseous flooding system is installed within a telecommunications space:

- safety information relating to the gaseous flooding system shall be displayed in accordance with the BS 5306 series of standards; and
- facilities for manually disabling the flooding system shall be provided.

NOTE 1 Gaseous flooding systems using carbon dioxide are specified in ISO 6183.

NOTE 2 Gaseous flooding systems other than those using carbon dioxide are specified in the BS EN 15004 series.

4.1.5 Remote powering

4.1.5.1 General

The specification and planning of telecommunications cabling intended to provide power to remote devices shall meet the requirements given in **4.1.5.2** and **4.1.5.3.**

4.1.5.2 Requirements for owners of premises housing telecommunications systems

The premises owner shall define their objectives with respect to remote powering within the installation specification.

4.1.5.3 Planning

The designer of the cabling system shall take appropriate actions from the following list to ensure that the impact (see **A.2**) of the defined objectives for remote powering (see **5.1.4.4**) is compatible with the products used and the transmission performance specified for the cabling.

a) the use of larger conductor/lower resistance cables – to minimize heating effects and lower the operating cost of the cabling system;

b) the effect of bundle size and/or the ventilation of pathways and spaces – to minimize the impact of heating effects;

c) the assessment of global heating – to ensure insertion loss requirements are met;

d) the need for sacrificial connections and appropriate labelling of connection points - to protect against the possibility of repeated de-mating under load;

e) specific labelling to ensure that any remote powering loading limits are not exceeded.

4.2 Operating procedures

Telecommunications equipment and telecommunications cabling shall be operated in accordance with the instructions provided by the installer.

The premises owner shall operate the cabling system in accordance with the remote powering parameters defined in the operating instructions (see **5.1.4.4**).

The selection and operation of optical fibre telecommunications equipment, test equipment and optical fibre telecommunications cabling shall be in accordance with BS EN 60825-2.

The operation of telecommunications equipment and telecommunications cabling in situations where explosive or flammable materials are generated, prepared, processed, handled, stored or otherwise encountered shall be carried out in accordance with BS EN 60079-14.

4.3 Maintenance

4.3.1 General

The telecommunications equipment and telecommunications cabling shall be maintained in accordance with the instructions provided by the installer.

All relevant personnel shall be made aware of all policies required to maintain proper operation of the telecommunications system.

NOTE 1 Attention is drawn to the Electricity at Work Regulations 1989 [6] in respect of the maintenance of cabling and associated equipment.

NOTE 2 Maintenance plans in accordance with BS EN 50174-1 should be considered for telecommunications equipment.

4.3.2 Overhead telecommunications cabling (including drop wires)

The specification and planning of overhead cabling installations shall conform to the requirements of BS EN 50174-3. When subject to pole bending by maintenance personnel and/or processes, telecommunications cables crossing maintainable highways, other than motorways or designated high load routes, shall be maintained at a height of not less than 4.95 m.

NOTE The terms "motorway" and "main roads" used in BS EN 50174-3 are interpreted in the UK as "motorway (blue sign)" and designated "high load routes".

4.4 Repair

Independent of the configuration of installed telecommunications equipment and telecommunications cabling, there shall be a documented policy for use in the event of faults and breakdowns.

NOTE 1 This policy should include contingency planning, fault analysis and repair procedures.

NOTE 2 Repair plans in accordance with BS EN 50174-1 should be considered for telecommunications equipment.

5 Requirements for installers of telecommunications equipment and telecommunications cabling

5.1 General

5.1.1 Compliance with the BS EN 50174 series of standards

All telecommunications cabling and telecommunications equipment shall meet all the requirements of the BS EN 50174 series of standards.

5.1.2 Documentation and administration

The documentation requirements of BS EN 50174-1:2009+A2:2014, Clause **5** shall be met for telecommunications equipment.

Installation, operating and maintenance instructions for all telecommunications equipment to be installed shall be obtained.

All relevant documentation shall be provided to enable the owner of the premises to implement operating procedures for the telecommunications system(s).

5.1.3 Products and processes

NOTE Attention is drawn to the Construction (Design and Management) Regulations 2015 [5] in respect of hazards.

5.1.3.1 Compatibility with fire extinguishing systems

The potential for damage to, and subsequent interruption of service provided by, the telecommunications equipment and telecommunications cabling to be installed following activation of the fire extinguishing system shall be identified, documented and given to the owner of the premises housing, and/or the operator of, the telecommunications system.

5.1.3.2 Potentially explosive atmospheres

Telecommunications equipment in situations where explosive or flammable materials are generated, prepared, processed, handled, stored or otherwise encountered shall be in accordance with BS EN 61241-14, BS EN 61241-17, BS EN 60079-14 and BS EN 60079-17, as appropriate.

5.1.3.3 Electrostatic protection

Where used, electrostatic protection devices for both telecommunications equipment and personnel shall conform to BS EN 61340-5-1.

5.1.4 Installation procedures

NOTE 1 Attention is drawn to the Confined Spaces Regulations 1997 [7].

NOTE 2 Attention is drawn to the Control of Substances Hazardous to Health Regulations 2002 [8] in respect of documented procedures for substances that are hazardous to health.

5.1.4.1 Optical fibre telecommunications equipment and telecommunications cabling

The operation of optical fibre test equipment shall be in accordance with BS EN 60825-2.

5.1.4.2 Potentially explosive atmospheres

The installation of telecommunications equipment and telecommunications cabling in situations where explosive or flammable materials are generated, prepared, processed, handled, stored or otherwise encountered shall be carried out in accordance with BS EN 61241-14, BS EN 61241-17, BS EN 60079-14 and BS EN 60079-17, as appropriate.

5.1.4.3 Static electricity and electromagnetic environment

Measures shall be taken in accordance with PD CLC/TR 50404 to reduce the risk of damage to telecommunications equipment by static electricity.

Measures shall be taken in accordance with PD CLC/TR 50426 and PD CLC/TR 50427 to prevent inadvertent ignition of flammable atmospheres or initiation of electro-explosive devices by radio-frequency radiation.

5.1.4.4 Remote powering

The installer of the cabling system shall:

a) ensure that the installation environment is compatible with the defined objectives for remote powering and highlight any deficiencies to the building owner; and

b) provide instructions for the operation of remote powering to ensure that the intended performance of the cabling is maintained.

5.2 Earthing

5.2.1 Protective earthing

PE connections shall be installed in accordance with BS 7671:2008+A3:2015.

5.2.2 Functional earthing

5.2.2.1 General

An FE conductor shall be provided to all telecommunications equipment requiring an FE connection.

FE connections provided by PE cabling shall be in accordance with **5.2.2.2**. FE connections not provided by PE cabling shall be in accordance with **5.2.2.3**.

In order to prevent large earth loop or fault currents, telecommunications equipment shall only be connected to an FE conductor that serves the building in which the telecommunications equipment is installed.

The FE connection shall not be a plug/socket connection.

The FE cabling shall be continuous at and between all points providing a FE connection to the telecommunications equipment.

5.2.2.2 FE connection provided by PE cabling

Where an FE connection is provided by means of PE cabling and/or where telecommunications equipment has a PE connection that can be used as a FE connection:

a) the PE installation and associated connections shall be in accordance with **5.2.1**;

b) the outer insulation of the PE conductor shall be green/yellow in accordance with BS EN 60446;

c) a label or tag marked with the words “SAFETY/TELECOMMS EARTH DO NOT REMOVE” shall be attached to the FE adjacent to all connection points; and

d) metallic elements such as armouring, conduit, pipes, metallic frames and trunking shall not be used to provide an FE path.

Where the requirement for the FE conductor is not met by the minimum PE conductor requirement then the FE requirement shall take precedence. In such cases the FE requirement shall be met by either:

- a separate FE conductor meeting the requirements of **5.2.2.3**; or
- a larger PE conductor meeting the requirements of the FE.

5.2.2.3 FE connection not provided by PE cabling

Where necessary, the owner of the premises and/or the operator shall be consulted for information regarding the location of the MET.

Where an FE connection is not provided by PE cabling, the FE conductor shall be connected to earth at the MET in accordance with BS 7671. At the connection point at the MET, the FE conductor shall be clearly identified by a label or tag that includes the words "TELECOMMS EARTH DO NOT REMOVE".

The FE conductor shall connect the MET to the FE terminal of any telecommunications equipment that is not connected to a PE.

The FE conductor shall be in accordance with the requirements of the supplier of the telecommunications equipment to be connected (including, where appropriate, the provision of a path to operate low voltage d.c. fuses or other overcurrent devices). The FE conductor shall be either a separate cable or a conductor in a multi-conductor cable. Where the FE conductor is provided as a separate cable, the cable sheath shall be:

- cream in colour; and
- continuously marked with the words "TELECOMMS FUNCTIONAL EARTH".

5.2.2.4 Bonding of cabinets, frames and racks

Cabinets, frames and racks and their contents containing, or intended to contain, telecommunications equipment or metallic telecommunications cabling shall be bonded in accordance with BS EN 50310.

5.3 Power supplies

Documentation shall be provided to the owner of the premises detailing the power consumption requirements of the telecommunications equipment to be supplied and installed.

5.4 Telecommunications cabling

5.4.1 General

NOTE 1 Attention is drawn to the Building Regulations [9] [10] [11] and BS 8300 in respect of access to telecommunications systems.

NOTE 2 Attention is drawn to the Electricity Safety, Quality and Continuity Regulations 2002 [12] in respect of supply of mains electrical power to premises containing telecommunications systems.

5.4.2 Telecommunications cabling outside buildings

Overhead cabling installations shall comply with the requirements of BS EN 50174-3.

Appropriate allowances or design features shall be applied such that, when subject to pole bending by installation personnel and/or processes, telecommunications cables crossing maintainable highways, other than motorways or designated high load routes, are maintained at a height of not less than 4.95 m.

NOTE The terms "motorway" and "main roads" used in BS EN 50174-3 are interpreted in the UK as "motorway (blue sign)" and designated "high load routes".

5.4.3 Segregation of telecommunications cabling and electricity supply cabling

*NOTE 1 The requirements for separation for the protection of telecommunications cabling and attached equipment (see **5.4.4.2**) always take precedence over the requirements for segregation for purposes of reduction of electromagnetic interference (see **5.4.4.1**). However, the most stringent requirements of **5.4.4** apply.*

NOTE 2 This subclause contains general requirements for telecommunications cabling and electricity supply cabling which also apply where the cables are installed in the same compartment of a cable management system (ducts, conduits and trenches, unless subdivided, are single compartment cable management systems). The requirements also apply to cables that carry the voltages specified that are not electricity cables.

5.4.4 Information technology cabling within buildings and other structures

5.4.4.1 Electromagnetic interference

The segregation of cabling with regard to electromagnetic interference shall be in accordance with BS EN 50174-2.

5.4.4.2 Protection of telecommunications cabling and attached equipment

*NOTE The following requirements represent the "Local regulations for safety" referred to in BS EN 50174-2:2009+A2:2014, **6.1**.*

Telecommunications cabling shall not be installed in any compartment of a cable management system that contains LV electricity supply cabling with unenclosed live terminals.

Telecommunications cabling and LV power supply cabling shall be separated by a distance:

a) ≥150 mm;

b) ≥50 mm, where the separation is provided and maintained by a partition as specified in BS 7671:2008+A3:2015, section 528; or

c) 50 mm where one or more of the following conditions are met:

   1) the LV electricity supply cables are enclosed in a separate conduit or trunking which, if metallic, is bonded in accordance with BS 7671;

   2) the LV electricity supply cables are of a mineral-insulated type;

   3) the LV electricity supply cables are of an earthed armoured construction;

   4) the LV electricity supply cables are of a flexible, insulated and sheathed type (e.g. "kettle leads" supplying LV mains power to telecommunications equipment in cabinets).

Where telecommunications cables and the electricity supply cables cross and there is a risk of damage, mechanical protection shall be provided at the crossing point.

5.4.5 Underground information technology cabling

5.4.5.1 Electromagnetic interference

The segregation of cabling with regard to electromagnetic interference shall be in accordance with BS EN 50174-3.

5.4.5.2 Protection of telecommunications cabling and attached equipment

Information technology cabling underground shall be installed in accordance with BS EN 50174-3.

5.4.6 Aerial information technology cabling

5.4.6.1 Electromagnetic interference

The segregation of cabling with regard to electromagnetic interference shall be in accordance with BS EN 50174-3.

5.4.6.2 Protection of telecommunications cabling and attached equipment

Information technology cabling above ground shall be installed in accordance with BS EN 50174-3 where the recommendations are treated as normative.

Annex A (informative) Remote powering

A.1 General

The contents of this Annex are generally applicable but are specifically tailored to cabling in accordance with BS EN 50173 series and similar standards.

The objective of this Annex is to point towards the design, planning and operational aspects of PD CLC/TR 50174-99-1 and the BS EN 50174 series as requirements are added in those documents.

A.2 Impact

Remote powering of devices attached to cabling has a number of potential impacts which are listed below:

a) Heating effects due to resistance – the flow of current in a cable will increase the temperature of the conductors and insulation which in turn will increase the resistance of the conductors. This effect escalates until steady-state is reached. Any heating effect is additional to that generated by ambient conditions (in proximity to hot water pipes, exposure to indirect sunlight, etc.).

b) Local heating – which risks elevating the cable temperature above its operating limit – occurs where cabling is contained in an environment which restricts the dissipation of the heating in the cable. (e.g. bundling, installation in conduit, the presence of insulating material, fire-stopping, etc.) This effect can cause a localized rise in temperature leading to an increase in resistance.

c) Global heating – the operation of cabling supporting remote powering at globally elevated temperatures, either due to the summation of all local heating effects or an elevated ambient temperature, will cause a global rise in insertion loss in the cabling. This effect risks limiting the supportable applications for cabling of a given length or a requirement to reduce the design length to deliver the required application.

d) Poor management/operating practices can lead to de-mating under load which risks spark damage to connector contacts which might degrade the electrical performance and shorten the operating life of the connector.

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Standards publications

For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS 8300, Design of buildings and their approaches to meet the needs of disabled people – Code of practice

BS EN 15004-1, *Fixed firefighting systems – Gas extinguishing systems – Part 1: Design, installation and maintenance*

BS EN 15004-2*, Fixed firefighting systems – Gas extinguishing systems – Part 2: Physical properties and system design of gas extinguishing systems for FK-5-1-12 extinguishant*

BS EN 15004-3, *Fixed firefighting systems - Gas extinguishing systems – Part 3: Physical properties and system design of gas extinguishing systems for HCFC Blend A extinguishant*

BS EN 60297-3-105, Mechanical structures for electronic equipment – Dimensions of mechanical structures of the 482,6 (19 in) series – Part 3-105: Dimensions and design aspects of 1U high chassis

BS PD CLC/TR 50174-99-1, *Information technology. Cabling installation – Remote powering*

HD 60364-4-444, *Low voltage electrical installation – Part 4-444: Protection for safety – Protection against voltage disturbances and electromagnetic disturbances*

ISO 6183, *Fire protection equipment – Carbon dioxide extinguishing systems for use on premises – Design and installation*

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[1] GREAT BRITAIN. Electromagnetic Compatibility Regulations 2006. London: The Stationery Office.

[2] GREAT BRITAIN. Electrical Equipment (Safety) Regulations 1994. London: HMSO.

[3] GREAT BRITAIN. Provision and Use of Work Equipment Regulations 1998. London: The Stationery Office.

[4] GREAT BRITAIN. Work at Height Regulations 2005, as amended. London: The Stationery Office.

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[10] SCOTLAND. Building (Scotland) Regulations 2004. Edinburgh: The Stationery Office.

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