Standards

Cabling Standards Overview

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There are a number of cabling standards bodies to read from. It will depend on your location as to which one is most applicable.

- North American
- International
- European

ANSI/TIA/EIA 568-B STANDARD

Introduction

The American National Standards Institute (ANSI) has served in its capacity as administrator and coordinator of the United States private sector voluntary standardization system for more than 80 years. Founded in 1918 by five engineering societies and three government agencies, the Institute remains a private, non-profit membership organization supported by a diverse constituency of private and public sector organizations.

Through ANSI, the United States has immediate access to the ISO and IEC standards development processes. ANSI participates in almost the entire technical program of both the ISO (78% of all ISO technical committees) and the IEC (91% of all IEC technical committees) and administers many key committees and subgroups (16% in the ISO; 17% in the IEC) . As part of its responsibilities as the U.S. member body to the ISO and the IEC, ANSI accredits U.S. Technical Advisory Groups (U.S. TAGs) or USNC Technical Advisors (TAs). The U.S. TAG's (or TA's) primary purpose is to develop and transmit, via ANSI, U.S. positions on activities and ballots of the international technical committee.

In many instances, U.S. standards are taken forward, through ANSI or its USNC, to the ISO or IEC where they are adopted in whole or in part as international standards. Since the work of international technical committees is carried out by volunteers from industry and government, not ANSI staff, the success of these efforts often is dependent upon the willingness of U.S. industry and the U.S. government to commit the resources required to ensure strong U.S. technical participation in the international standards process.

For further information, please contact
ANSI American National Standards Institute (ANSI)

430 Broadway
New York,
NY 10018
USA (212) 642-4900
www.ansi.org

EIA/TIA Electronic Industries Association (EIA)
2500 Wilson Blvd.,
Suite 400 Arlington,
VA 22201-3836
USA
(703) 907-7500

There are many standards covering cabling. Here are just a few major documents everyone in the industry should know. www.tiaonline.org

ANSI/TIA/EIA 568-B Series

The series comes in three parts:

1. ANSI/TIA/EIA 568-B.1 Commercial Building Telecommunications Cabling Standard
2. ANSI/TIA/EIA 568-B.2 100 Ohm Twisted Pair Cabling Standard
3. ANSI/TIA/EIA 568-B.3 Optical Fiber Standards

These standards incorporate and refine the technical content of:

- TIA/EIA TSB67
- TIA/EIA TSB72
- TIA/EIA TSB75
- ANSI/TIA/EIA-568-A-1 - Delay & Delay Skew
- ANSI/TIA/EIA-568-A-2 - Misc. changes
- ANSI/TIA/EIA-568-A-3 - Hybrid and Bundled Cables
- ANSI/TIA/EIA-568-A-4 - Patch Cords
- ANSI/TIA/EIA-568-A-5 - Category 5e
- TIA/EIA/IS-729 – Technical Specifications for 100 Ohm Screened Twisted-Pair Cabling

These are the addendums added since the original publication of the now obsolete ANSI/TIA/EIA 568-A in 1995.

These documents do not include parameters for the specification of 250MHz Category 6. This is addressed in ANSI/TIA/EIA 568-B.2-1 as an addendum.

The B Series takes precedence over the technical contents of the aforementioned bulletins, addenda and interim standard.

All definitions have been harmonized across all telecommunications infrastructure standards. We now have performance specifications provided for Category 5e balanced 100 Ohm cabling, not exclusive to UTP. Added are performance specifications provided for 50/125 mm optical fiber and cables. Alternate fiber connector designs are allowed in addition to the 568SC, this is with reference to the new Small Form Factor Connectors.

One of the many critical changes from the previous ANSI/TIA/EIA 568-A and its five addendums, is the dropping of the basic link in favor of the permanent link.

ANSI/TIA/EIA-569-A: Commercial Building Standard for Telecommunications Pathways and Spaces

Originally published in February 1998, this standard encompasses telecommunications considerations both within and between buildings. The aspects covered are the pathways into which telecommunications media are placed and the rooms and areas associated with the building used to terminate media and install telecommunications equipment.

There are currently seven addendums to this standard

1. Addendum 1 - Surface Raceways
2. Addendum 2 - Furniture Pathways and Spaces
3. Addendum 3 - Access Floors
4. Addendum 4 - Poke-Thru Fittings
5. Addendum 5 - In Floor Systems
6. Addendum 6 -Multi-Tenant Pathways and Spaces
7. Addendum 7 - Cable Trays and Wireways

ANSI/TIA/EIA-570-B: Residential Telecommunications Cabling Standard

This document standardizes requirements for residential telecommunications cabling. These requirements are based on the facilities that are necessary for existing and emerging telecommunications services. Cabling specifications for voice, video, data, home automation, multimedia, security, audio, HVAC are made available. The standard is for new construction, additions, and remodeled single and multi-tenant residential buildings.

ANSI/TIA/EIA-606A: Administration Standard for the Telecommunications Infrastructure of Commercial Buildings

The purpose and intent of this standard is to provide a uniform administration scheme that is independent of applications, which may change several times throughout the life of a building. This standard establishes guidelines for owners, end users, manufacturers, consultants, contractors, designers, installers, and facilities administrators involved in the administration of the telecommunications infrastructure or related administration system.

ANSI/TIA/EIA-607A: Commercial Building Grounding and Bonding Requirements for Telecommunications

The purpose of this standard is to enable the planning, design, and installation of telecommunications grounding and bonding systems within a building with or without prior knowledge of the telecommunications systems that will subsequently be installed. This standard also provides recommendations for grounding and bonding of customer owned towers and antennas. This telecommunications grounding and bonding infrastructure supports a multivendor, multiproduct environment as well as various system installation practices.

ISO / IEC 11801 STANDARD

Introduction

The International Organization for Standardization (ISO) is a worldwide federation of national standards bodies from some 130 countries, one from each country.

ISO is a non-governmental organization established in 1947. The mission of ISO is to promote the development of standardization and related activities in the world with a view to facilitating the international exchange of goods and services, and to developing cooperation in the spheres of intellectual, scientific, technological and economic activity.

ISO's work results in international agreements which are published as International Standards.

Many people will have noticed a seeming lack of correspondence between the official title when used in full, International Organization for Standardization, and the short form, ISO. Shouldn't the acronym be "IOS"? Yes, if it were an acronym – which it is not.

In fact, "ISO" is a word, derived from the Greek isos, meaning "equal", which is the root of the prefix "iso-" that occurs in a host of terms, such as "isometric" (of equal measure or dimensions) and "isonomy" (equality of laws, or of people before the law).

From "equal" to "standard", the line of thinking that led to the choice of "ISO" as the name of the organization is easy to follow. In addition, the name ISO is used around the world to denote the organization, thus avoiding the plethora of acronyms resulting from the translation of "International Organization for Standardization" into the different national languages of members, e.g. IOS in English, OIN in French (from Organisation internationale de normalisation). Whatever the country, the short form of the Organization's name is always ISO.

The existence of non-harmonized standards for similar technologies in different countries or regions can contribute to so-called "technical barriers to trade". Export-minded industries have long sensed the need to agree on world standards to help rationalize the international trading process. This was the origin of the establishment of ISO.

For further information, please contact
International Organization for Standardization (ISO)
1, rue de Varembé,
Case postale 56
CH-1211 Geneva 20,
Switzerland
www.iso.ch

There are many standards covering cabling. Some are relevant, some not. Here are the ones that you should aim to purchase and read.

ISO/IEC 11801

The ISO/IEC 11801 Standard defines a generic cabling system which is application independent and supports an open market for cabling components. It is designed to provide users with a flexible cabling scheme such that changes are both easy and economical to implement. The Standard is also designed to provide architects with guidance on the design of cabling systems for implementation in buildings where user requirements can not be foreseen i.e. in the initial planning either for construction or refurbishment. In addition, it provides the industry with a cabling system which will support current active equipment and provides a basis for future developments.

ISO/IEC 11801:2002 specifies cabling for use within commercial premises which may comprise of single or multiple buildings on a campus. It covers balanced copper cabling and optical fiber cabling. The principles of this standard may be applied to installations that do not fall within this range.

Cabling defined by this standard supports a wide range of services including voice, data, text, image and video.

This International Standard specifies:

- the structure and minimum configuration for generic cabling;
- implementation requirements;
- performance requirements for individual cabling links;
- conformance requirements and verification procedures.

Cables and cords used to connect application specific equipment to the generic cabling system are outside of the scope of this standard. Since they have significant effect on transmission characteristics of the channel, assumptions and guidance are provided on their performance and length. Safety and electromagnetic compatibility (EMC) requirements are outside the scope of this standard and are covered by other standards and regulations. However, information given in this standard may be of assistance in meeting these standards and regulations.

Conformance

For a cabling installation to conform to this standard, the configuration shall conform to the following:-

Generic cabling schemes consist of three cabling sub systems: Campus Backbone, building backbone and horizontal cabling. This overview will deal with the horizontal element only, although it will take into due consideration, the other elements. The cabling subsystems are connected together to create a generic cabling structure (as shown above). The distributors provide the means to configure the cabling to support different topologies like bus (ISDN), star (Ethernet) and ring (Token Ring).

Campus Backbone Cabling Subsystem

The campus backbone cabling subsystem extends from the campus distributor to the building distributor, usually located in separate buildings. When present it includes the campus backbone cables, the mechanical termination of the backbone cables and the cross connections at the distributor. The campus backbone may also interconnect building distributors.

Building Backbone Cabling Subsystem

A building backbone cabling subsystem extends from building distributor(s) to floor distributor(s). The subsystem includes the building backbone cables, the mechanical termination of the backbone cables and the cross connections at the building

distributor. the building backbone cables shall not contain transition points and copper cables should not contain splices.

Horizontal Cabling Subsystem

The horizontal cabling subsystem extends from a floor distributor to the telecommunications outlet(s) connected to it. The subsystem includes the horizontal cables, the mechanical termination of the horizontal cables and the floor distributor, the cross-connections at the floor distributor and the telecommunications outlets.

Horizontal cables should be continuous from the floor distributor to the telecommunications outlets. If necessary, one transition point is permitted between a floor distributor and any telecommunications outlet. The transmission characteristics of the horizontal cabling shall be maintained. The consolidation point shall not be used as a point of administration (i.e. not used as a cross-connect). and active equipment shall not be located there.

Work Area Cabling

The work area cabling connects the telecommunications outlet to the terminal equipment. It is non-permanent and application-specific and therefore lies outside of the scope of ISO/IEC 11801.

Telecommunications Outlet

Telecommunications outlets are normally located on the wall, floor or elsewhere in the work area. Telecommunications outlets may be presented singly, or in groups, but each individual work area shall be served by a minimum of two. Telecommunications outlets shall be marked with a permanent label that is visible to the user. Pair re-assignment shall be done by means of external adaptors.

Telecommunications Closets and Equipment Rooms

A telecommunications closet should provide all the faculties (space, power, environmental control etc.) for passive components, active devices, and public network interfaces housed within it. Each telecommunications closet should have direct access to the backbone.

Link Performance

Components and cables are defined as categories, however, the link is defined a falling into one of four classes. The standard divides installed copper links:-

- Class A - Includes speech band and low frequency applications. Copper cabling links supporting Class A applications are specified up to 100KHz.
- Class B - Includes medium bit rate data applications. Copper cabling links supporting Class B applications are specified up to 1MHz.
- Class C - Includes high bit rate data applications. Copper links supporting Class C applications are specified up to 16MHz.
- Class D - Includes very high bit rate data applications. Copper links supporting Class D applications are specified up to 100MHz.
- Class E - Future applications. Copper links supporting Class E applications are specified up to 250MHz.
- Class F - Future applications. Copper links supporting Class F applications are specified up to 600MHz.

ISO/IEC 14763-1: Administration, documentation, records

This standard describes requirements for administration systems and documentation of pathways, spaces, cables, terminations, and grounding in accordance with ISO/IEC 11801. This standard does not recommend a specific type of administration system.

Rather, it identifies fundamental principles such that individuals and organisations that own, or are responsible for a telecommunications infrastructure can, by use of this document, develop an administration system that is suitable to their needs.

ISO/IEC 14763-2: Planning and Installation practices

Specifies requirements for planning, specification, quality assurance and installation of new cabling in accordance with ISO/IEC 11801.

ISO/IEC 14763-3: Testing of optical fiber cabling

Outlines test procedures to be used to ensure that optical fiber cabling, designed in accordance with ISO/IEC 11801 and installed according to the recommendations of ISO/IEC 14763-2, is capable of delivering the level of transmission performance specified in ISO/IEC 11801.

IEC 61935-1: Specification for the testing of balanced communication cabling in accordance with ISO/IEC 11801- Part 1: Installed cabling

Telecommunication cabling, once specified uniquely by each telecommunications application, has evolved into a generic cabling system. Telecommunications applications now use the ISO/IEC 11801 cabling standard to meet their cabling requirements. Formerly, connectivity tests and visual inspection were deemed sufficient to verify a cabling installation. Now users need more comprehensive testing in order to ensure that the link will support telecommunications applications that are designed to operate on the generic cabling system. This part of IEC 61935 addresses reference laboratory and field test methods and provides a comparison of these methods. Transmission performance depends on cable characteristics, connecting hardware, patch cords and cross-connect cabling, the total number of connections, and the care with which they are installed and maintained. This standard provides test methods for installed cabling and pre-fabricated cable assemblies. These test methods, where appropriate, are based on those used for components of the cable assembly. This part 1 contains the test methods required for installed cabling. Part 2 WILL contain the test methods required for patch cords and work area cables. That is still in draft

IEC 61935-2: Specification for the testing of balanced communication cabling in accordance with ISO/IEC 11801 — Part 2: Patch cords and work area cabling

This International Standard IEC 61935-2 applies. to provide method to ensure compatibility of modular plug cords to be used in cabling according to IS 11801 as well as to provide test methods and associated requirement to demonstrate the performance and reliability of these cords during their length of live.

EN 51073 STANDARD

CENELEC is the European Committee for Electrotechnical Standardization. It was set up in 1973 as a non-profit-making organization under Belgian Law. It has been officially recognized as the European Standards Organization in its field by the European Commission in Directive 83/189/EEC.

Its members have been working together in the interests of European harmonization since the late fifties, developing alongside the European Economic Community. CENELEC works with 35,000 technical experts from 19 European countries to publish standards for the European market.

CENELEC Central Secretariat

Manned by 31 people, CENELEC Central Secretariat is a conglomerate of services designed to answer the needs for European standardization and to serve the purpose of drafting, organizing approval on and publishing European Standards. CENELEC being a service organization, the Central Secretariat has been logically organized on the basis of a service model established by the Harvard Business School.

Collaborating in harmony, the different services weave themselves into one another in order to produce the very fabric of CENELEC which supports European standardization.

The present capacity of work volume exceeds more than one document ready for publication each calendar day.

For further information, please contact
CENELEC
35 rue de Stassart,
B-1050 Brussels
Belgium
www.cenelec.org

EN50173:2002

You will find that EN 50173 closely follows ISO/IEC 11801, due to many of the members of the Technical Committee CENELEC TC 215 attending ISO and IEC meetings.

Another not so well known fact, is that Government Utilities (Schools, Local Councils etc.) must specify a European Norm, where possible, for IT Tenders in excess of 50,000 Euros.

When it comes to testing, we will eventually get a European Norm for field testing, but at this time must rely on IEC 61935-1. European Norms are allowed to reference IEC Standards but not national standards such as ANSI/TIA/EIA-568-B.

The norms are set in a fashion that applies to real world planning,

Building Design Phase

EN 50310 - Application of Equipotential Bonding and Earthing in Buildings with Information Technology Equipment

Cabling Design Phase
EN 50173 and/or EN 50098-1 or -2

Planning Phase
EN 50174 Part 1 - Specification and Quality Assurance
EN 50174 Part 2 - Installation planning and practices inside buildings
EN 50174 Part 3 - Installation planning and practices outside buildings (Draft, not available until at least Dec 2002)
EN 50310 - Application of Equipotential Bonding and Earthing in Buildings with Information Technology Equipment

Implementation Phase
EN 50174 Part 1 - Specification and Quality Assurance
EN 50174 Part 2 - Installation planning and practices inside buildings
EN 50174 Part 3 - Installation planning and practices outside buildings
EN 50310 - Application of Equipotential Bonding and Earthing in Buildings with Information Technology Equipment
EN 50346 - Testing of Installed Cabling

Operation Phase
EN 50174 Part 1 - Specification and Quality Assurance

EN 50310: Application of Equipotential Bonding and Earthing in Buildings with Information Technology Equipment
This draft standard addresses earthing and bonding of information technology equipment in buildings in relation to safety, functional and electromagnetic performance, taking into account that the draft does not specify another earthing and bonding system but selects out of the existing ones (specified in HD 384 series together with IEC 60364-5-548) the best suitable system to information technology needs (CBN, MESH-BN, TN-S system).

Information regarding the general principles on earthing for (small) telecommunication installations in buildings has been published in Recommendation ITU-T K.31.

Depending on the degree of complexity and the size of the information technology installation, different levels of earthing and bonding are required. Starting from basic requirements on earthing and bonding this standard defines the refinements necessary to operate information technology equipment. The underlined concepts of this standard are in harmony with ETS 300 253. Therefore large information technology installations in buildings, which may require special care to avoid damage or upset from electromagnetic sources can make use of the bonding configurations and earthing techniques of ETS 300 253.

The specifications of EN 50310 are intended to provide optimum earthing and bonding conditions for buildings, where information technology installations are to be operated. EN 50310 should be applied at least in the case of newly constructed buildings and whenever possible in existing buildings (e. g. on the occasion of refurbishment). EN 50174-2 details the considerations for satisfactory installation and operation of information technology cabling within the environment of a building operating a low-voltage electricity.

EN 50174-1: Specification and Quality Assurance

This standard comprises three parts, this being part 1. All three parts support the specification, implementation and operation of information technology cabling using both balanced copper and optical fiber cabling components. These components are combined to provide cabling solutions either in accordance with the design requirements of EN 50173 or to meet the requirements of one or more application-specific standards (such as EN 50098-1 or EN 50098-2).

This part is intended to be referenced in contracts between cabling installers and their customers. However, the range of options featured in many of the clauses make a single conformance statement impossible. For this reason the standard should be read carefully to ensure that the requirements of the standard (as defined by the use of the word "shall") are adhered to where conformance is required under the terms of any contract.

EN 50174-2: Installation planning and practices inside buildings

This standard comprises three parts. All three parts support the specification, implementation and operation of information technology cabling using both balanced copper and optical fiber cabling components. These components may be combined to provide cabling solutions either in accordance with the design requirements of EN 50173 or to meet the requirements of one or more application-specific standards (such as EN 50098-1 or EN 50098-2).

This part contains detailed requirements and guidance relating to the installation planning and practices inside buildings and is intended to be used by the personnel directly involved in the planning and installation of information technology cabling. It shall be used during the different implementation phases when installing information technology cabling, i.e. during the planning phase, the design phase and installation phase.

EN 50174-3: Installation planning and practices outside buildings

This part contains detailed requirements and guidance relating to the installation planning and practices outside buildings and is intended to be used by the personnel directly involved in the planning and installation of information technology cabling. It shall be used during the different implementation phases when installing information technology cabling, i.e. during the planning phase, the design phase and installation phase.

EN 50173: Information technology – Generic cabling systems

The EN 50173 Standard defines a generic cabling system which is application independent and supports an open market for cabling components. It is designed to provide users with a flexible cabling scheme such that changes are both easy and economical to implement. The Standard is also designed to provide architects with guidance on the design of cabling systems for implementation in buildings where user requirements can not be foreseen i.e. in the initial planning either for construction or refurbishment. In addition, it provides the industry with a cabling system which will support current active equipment and provides a basis for future developments.

EN 50173:2002 specifies cabling for use within commercial premises which may comprise of single or multiple buildings on a campus. It covers balanced copper cabling and optical fiber cabling. The principles of this standard may be applied to installations that do not fall within this range.

Cabling defined by this standard supports a wide range of services including voice, data, text, image and video.

EN 50346: Testing of Installed Cabling

Within premises, the importance of the information technology cabling infrastructure is similar to that of other fundamental building utilities such as heating, lighting and mains power supplies. As with other utilities, interruptions to service can have 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 organization's effectiveness.

A series of European standards have been prepared to support the successful installation of information technology cabling. These are:

- for design - EN 50173 and relevant application standards;
- for specification, implementation and operation - EN 50174 -1, EN 50174-2 and EN 50174-3.

This European standard specifies the requirements for the testing of installed balanced copper and optical fiber cabling. Such testing is commonly undertaken at contract interfaces and the requirements of this standard take the form of defined test procedures ensuring that results obtained are relevant, repeatable and credible. These test procedures may be:

- referenced within the installation specification;
- used during the implementation phase of the installation;
- used during the operational phase to diagnose application failures at the cabling level.

This standard does not define which tests should be applied or the quantity or percentage of installed cabling to be tested. The test parameters to be measured and the sampling levels to be applied for a particular installation should be defined in the installation specification and quality plans for that installation prepared in accordance with EN 50174-1.