SLOVENSKI STANDARD
SIST EN 50173:1997/A1:2000

01-junij-2000

Information technology - Generic cabling systems - Amendment A1

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Informationstechnik - Anwendungsneutrale Verkabelungssysteme

Technologies de l'information - Systèmes génériques de câblage

Ta slovenski standard je istoveten z: **EN 50173:1995/A1:2000**

ICS:

33.040.50	Vodi, zveze in tokokrogi	Lines, connections and circuits
35.110	Omreževanje	Networking

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NORME EUROPÉENNE

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ICS 33.040.50

English version

Information technology - Generic cabling systems

Technologies de l'information
Systèmes génériques de câblage

Informationstechnik Anwendungsneutrale
Verkabelungssysteme

This amendment A1 modifies the European Standard EN 50173:1995; it was approved by CENELEC on 2000-01-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this amendment the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This amendment exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

CENELEC
European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Ref. No. EN 50173:1995/A1:2000 E

Foreword

This amendment was prepared by CENELEC Technical Committee TC 215 “Electrotechnical aspects of telecommunication equipment” under the framework of Mandate M/212 on telecommunication cables and cabling systems.

The text of the draft was submitted to the formal vote and was approved by CENELEC as amendment A1 to EN 50173 on 2000-01-01.

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)	2001-01-01
- latest date by which the national standards conflicting with the amendment have to be withdrawn	(dow)	2002-01-01

Foreword of EN 50173

Replace twice “TC 115” by “TC 215” and **replace** “prEN 50098-2” by “EN 50098-2”

Clause 2

Add after EN 50082-1 the following references:

EN 50174-1 Information technology – Cabling installation - Part 1: Specification and quality assurance

EN 50289-1-6 (in preparation) Communication cables - Specifications for test methods - Part 1-6: Electrical test methods - Electromagnetic performance

and

EN 50289-1-9 (in preparation) Communication cables - Specifications for test methods – Part 1-9: Electrical test methods - Longitudinal conversion loss (unbalance attenuation)

Amend reference to EN 55022 to read: „(IEC/CISPR 22:1997)“

Add after EN 55022 the following reference:

EN 55024 Information technology equipment - Immunity characteristics - Limits and methods of measurement (IEC/CISPR 24:1997)

Amend reference to EN 60603-7 to read: „(IEC 60603-7:1996)“

Add after EN 60825-2 the following reference:

EN 61935-1 (in preparation) Generic specification for the testing of balanced generic cabling in accordance with ISO/IEC 11801 – Part 1: Test methods (IEC 61935-1)

Replace HD 323.2.14 by:

EN 60068-2-14 Environmental testing - Part 2: Tests - Test N: Change of temperature (IEC 60068-2-14:1984 + A1:1986)“

Replace HD 323.2.38 by

EN 60068-2-38 Environmental testing - Part 2: Tests – Test Z/AD: Composite temperature/humidity cyclic test (IEC 60068-2-38:1974)“

Add “60000” to any IEC number.

Subclause 3.2

Add the following abbreviations:

ELFEXT Equal level far-end crosstalk loss

FEXT Far-end crosstalk loss

PSACR Power sum attenuation to crosstalk loss ratio

PSELFEXT Power sum equal level far-end crosstalk loss

PSNEXT Power sum near-end crosstalk loss

Subclause 5.1

Replace the 5th paragraph **by**:

100 Ω and 120 Ω connecting hardware shall only provide a single direct onward connection for each conductor and shall not provide any electrical contact between conductors. For example bridged taps shall not be used.

Subclause 5.2.1

Replace the existing subclause 5.2.1 by the following text (including figures):

5.2.1 Horizontal distances

The maximum horizontal cable length shall be 90 m independent of medium (see figure 6). This is the cable length from the mechanical termination of the cable in the floor distributor to the telecommunications outlet in the work area.

In establishing the maximum length of the horizontal channel, the optional use of a crossconnect or an interconnect places different requirements on the total length of the flexible cables used.

Figure 7 shows examples of horizontal channel implementations which reflect these differing requirements of maximum cable length.

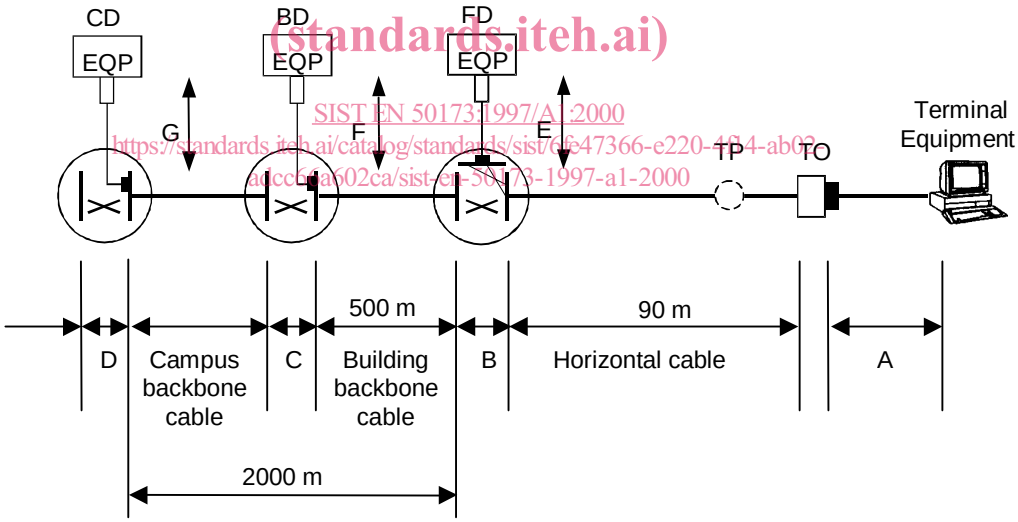
In Figure 7a, the maximum total length of work area cable, equipment cable and patch cord is 9 m based upon flexible cables with 50% greater attenuation (dB/m) than the horizontal cable and includes a crossconnect in the floor distributor.

In Figure 7b, the maximum total length of work area cable and equipment cable is 10 m also based upon flexible cables with 50% greater attenuation (dB/m) than the horizontal cable and includes an interconnect in the floor distributor.

In both cases the transition point is optional. It is required that the performance of the horizontal cabling is not degraded by the inclusion of the transition point.

For optical fibre, the implementation is shown in Figure 7c. An optical fibre splice, in accordance with clause 8, is allowed at both ends of the horizontal cable.

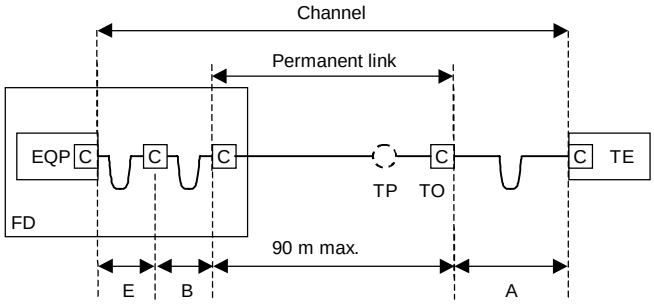
See clause 8 and Annex C for requirements for patch cords and other flexible cables. In all cases, equipment cables that meet or have better performance characteristics than patch cord requirements are recommended.



C, D =	20 m
F, G =	30 m
A, B, E	see Figure 7
EQP	application specific equipment
TP	Transition Point

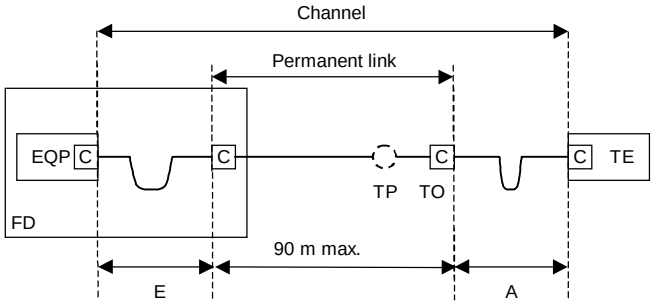
NOTE All lengths are mechanical

Figure 6 - Maximum cable lengths



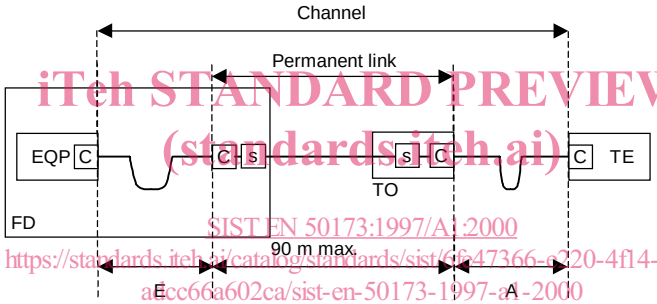
A+B+E = 9 m max.

a) Balanced copper horizontal cabling (with crossconnect)



A+E = 10 m max.

b) Balanced copper horizontal cabling (with interconnect)



A+E = 10 m max.

c) Optical fibre cabling (with interconnect)

C connection (e.g. plug and jack or mated optical connection)
S optical fibre splice
EQP application specific equipment
NOTE 1 All lengths are mechanical lengths
NOTE 2 See Annex C for further information on flexible cables

Figure 7 - Examples of horizontal channel implementation

For balanced cabling the design of the channel should also take into account the effect of elevated operating temperatures on attenuation.

NOTE Copper cable attenuation (dB/m) increases by approximately 2% for screened cable and 4% for unscreened cable for a temperature increase of 10 °C.

Subclause 5.2.3

Amend the Note as follows:

NOTE See 8.2.5, 8.3.5 and 8.4.4 for telecommunications outlets requirements that correspond to each of the cables listed above.

Clause 6

Replace clause 6 **by** the following text:

6 Permanent link and channel specifications

6.1 Permanent links and channels

6.1.1 General

This clause defines the permanent link and channel performance requirements of installed generic cabling. The performance of the cabling is specified for individual permanent links and channels and for two different media types (balanced cables and optical fibre). A tutorial on the material in this clause is provided in annex E.

The design rules of clause 5 can be used to create generic cabling links and channels containing components according to clauses 7 and 8. It is not necessary to measure every parameter specified in this clause as conformance may also be proved by suitable design. The permanent link and channel specifications in this clause allow for the transmission of defined classes of applications over distances other than those of clause 5, and/or using media and components with different transmission performance than those of clauses 7 and 8.

Each permanent link and channel shall conform to the complete set of performance requirements defined for that class of cabling.

The performance requirements described in this clause may be used as the basis for verification tests for any implementation of this European Standard using the test methods defined, or referred to, by this clause. The permanent link requirements are primarily intended to provide a basis for the acceptance testing of installed cabling. The channel requirements are primarily for application developers but are able to be used for troubleshooting or where application support is under development.

Permanent link and channel performance specifications shall be met for all temperatures at which the cabling is intended to operate. Performance testing may be carried out at ambient temperature, but there shall be adequate margins to account for temperature dependence of cabling components as per manufacturer's specifications. The effects of ageing should also be taken into account. In particular, consideration should be given to measuring performance at worst case temperatures, or calculating worst case performance based on measurements made at other temperatures.

Care should be exercised in the interpretation of any results obtained from alternative test methods or practices. When needed, correlation factors should be identified and applied.

6.1.2 Permanent links

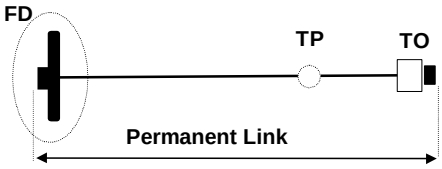
The performance of a permanent link is specified at and between interfaces to the link. The permanent link comprises only passive sections of cable and connecting hardware. A transition point may also be included in the horizontal subsystem. The interface of the permanent link is the far end of the plug or connecting block, where the flexible cable enters. The cable connected outside of the plug is not part of the permanent link (see figure 11a).

Active and passive application-specific hardware is not addressed by this European Standard.

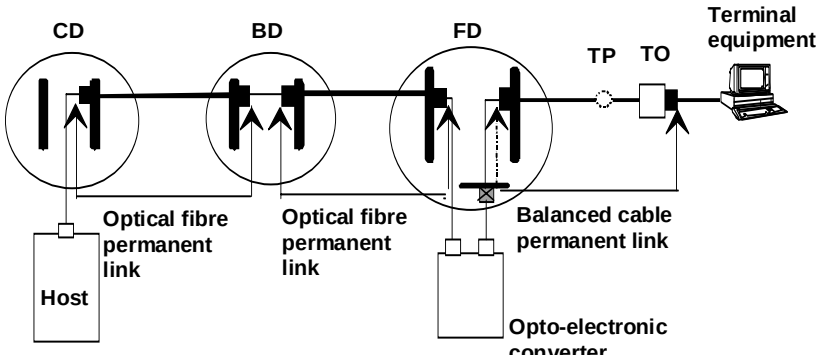
Figure 11b shows an example of terminal equipment in the work area connected to a host using three links; two optical fibre links and a balanced cable link. The optical fibre and balanced cable links are connected together using an optical fibre-to-balanced-cable converter, a cross connect and two equipment cables. Interfaces to the cabling are at each end of a permanent link. Interfaces to the cabling are specified at the telecommunications outlet and at any point where application specific equipment is connected to the cabling; the work area and equipment cables are not included in the permanent link.

6.1.3 Channels

The performance of a balanced cabling channel is specified at and between connections to active equipment. The cabling comprises only passive sections of cable, connecting hardware, work area cables, equipment cables and patch cords.



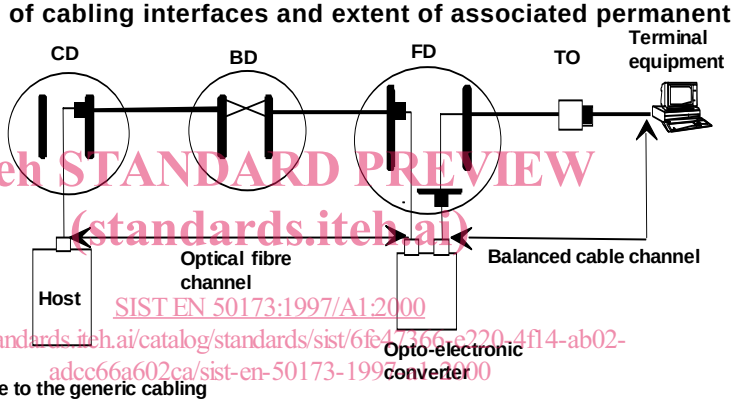
a) Permanent link



■ Interface to the generic cabling

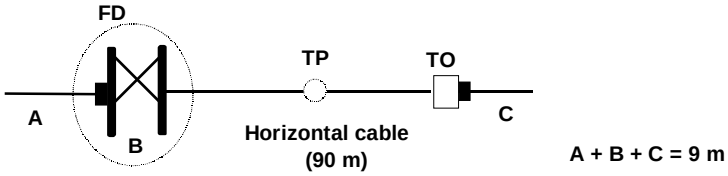
⊠ Optional interface when using a crossconnection

b) Location of cabling interfaces and extent of associated permanent links



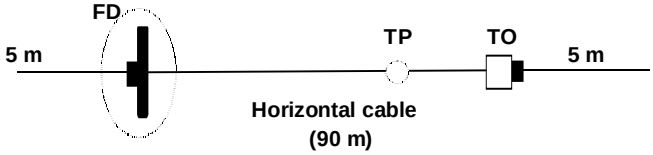
■ Interface to the generic cabling

c) Location of cabling interfaces and extent of associated channels



NOTE For balanced cabling, the 9 m total length of work area, equipment, and patch cable is based on flexible cables with 50% greater attenuation (dB/m) than the horizontal cable and allows for a cross-connection in the floor distributor. This example results in a calculated channel attenuation of 24,0 dB at 100 MHz using category 5 component requirements. A longer channel length may be achieved using flexible cable lengths with lower attenuation performance.

d) Class D channel implementation (with cross-connection)



NOTE For balanced cabling, the 10 m total length of work area and equipment cable is based on flexible cables with 50% greater attenuation (dB/m) than the horizontal cable. This example results in a calculated channel attenuation of 23,9 dB at 100 MHz using category 5 component requirements.

e) Class D channel implementation (with interconnection)

Figure 11: Examples of cabling systems

The interface of the channel is the far end of the work area or equipment cable just before the plug which is connected to the equipment.

Figure 11c shows an example of terminal equipment in the work area connected to a host using two channels; an optical fibre channel and a balanced cabling channel. The optical fibre and balanced cabling channels are connected together using an optical fibre to balanced cable converter. There are four channel interfaces; one at each end of the copper channel, and one at each end of the optical fibre channel. Equipment connections are not considered to be part of the channel. All work area cables, equipment cables and patch cords are included in the channel.

Figures 11d and 11e show examples of class D channel implementations with cross-connection and with interconnection.

6.2 Classification of applications, links and channels

6.2.1 Application classification

Five application classes for cabling have been identified for the purposes of this European Standard. This ensures that the limiting requirements of one system do not unduly restrict other systems.

The application classes are:

Application class A — Includes speech band and low frequency applications. Copper cabling permanent links and channels supporting class A applications are referred to as class A permanent links and class A channels, respectively.

Application class B — Includes medium bit rate data applications. Copper cabling permanent links and channels supporting class B applications are referred to as class B permanent links and class B channels, respectively.

Application class C — Includes high bit rate data applications. Copper cabling permanent links and channels supporting class C applications are referred to as class C permanent links and class C channels, respectively.

Application class D — Includes very high bit rate data applications. Copper cabling permanent links and channels supporting class D applications are referred to as class D permant links and class D channels, respectively.

Optical application class — Includes high and very high bit rate data applications. Optical fibre permanent links and channels supporting this application class are referred to as optical class permanent links and optical class channels, respectively.

NOTE Permanent link specifications are provided for field test verification and channel values provide minimum requirements for application support.

Annex F gives examples of applications that fall within the various application classes.

6.2.2 Link and channel classification

Generic cabling, when configured to support particular applications, comprises one or more permanent links and channels. Five permanent link and channel classes are defined, which relate to the application classes as indicated in 6.2.1.

Permanent link / channel class A	is specified up to 100 kHz.
Permanent link / channel class B	is specified up to 1 MHz.
Permanent link / channel class C	is specified up to 16 MHz.
Permanent link / channel class D	is specified up to 100 MHz.
Optical permanent link / channel class	is specified to support applications specified at 10 MHz and above.

For copper cabling links, permanent link or channel classes A to D are specified such that they will provide the minimum transmission performance to support applications of the related application class. Links and channels of a given class will support all applications of a lower class. Class A is regarded as the lowest class.

Optical parameters are specified for singlemode and multimode optical fibre links and channels.

Class C and D permanent links and channels correspond to full implementations of category 3 and category 5 horizontal cabling subsystems respectively, as specified in 5.2.

Table 2 relates the permanent link and channel classes to the cabling component categories of clauses 7 and 8. This table indicates the channel length over which the various applications may be supported.

The distances presented are based on near-end crosstalk loss (for copper cables), bandwidth (for optical fibre cables) and attenuation limits for various classes. Other characteristics of applications, for example propagation delay, may further limit these distances.

Consideration should be given, when specifying and designing cabling, to the possible future connection of cabling subsystems to form longer links and channels. The performance of these longer links and channels will be lower than that of any of the individual subsystem links and channels from which they are constructed. Measurement of permanent links and channels should be made initially, upon installation of each cabling subsystem. Testing of combined subsystems should be performed as required by the application.

Table 2 - Channel lengths achievable with different categories and types of cabling

Medium	Channel length for link class m				
	A	B	C	D	Optical
Category 3 balanced cable (see 7.2)	2000	200	100 [1)]	-	-
Category 5 balanced cable (see 7.2)	3000	260	160 [2)]	100 [1)]	-
150 Ω balanced cable (see 7.2)	3000	400	250 [2)]	150 [2)]	-
Multimode optical fibre (see 7.4)	N/A	N/A	N/A	N/A	2000 [3)]
Singlemode optical fibre (see 7.5)	N/A	N/A	N/A	N/A	3000 [4)]

1) The 100 m distance includes a 90 m length permanent link and a maximum allowance of 10 m of flexible cable for patch cords or jumpers, work area and equipment connections.

2) Applications limited by propagation delay may not be supported over lengths greater than 100 m. Application standards should be consulted.

3) The minimum bandwidth for a 2000 m multimode optical channel is specified in 6.4.3. Multimode applications may be limited to distances shorter than 2000 m. Consult application standards for limitations.

4) 3000 m is a limit defined by the scope of this European Standard and not a medium limitation.

6.3 Balanced permanent links and channels

6.3.1 General

The parameters specified in this subclause apply to permanent links with screened or unscreened cable elements, with or without an overall screen, unless explicitly stated otherwise. Unless stated otherwise, outline test configurations for all measurements on balanced cabling are given in annex A. Specialised test instruments are required for high frequency field measurements on balanced cabling. The maximum application frequencies are based on required permanent link and channel characteristics, and are not indicated by the maximum specified frequency for the cabling. In the following tables, the requirements for attenuation, near-end crosstalk loss (NEXT) and attenuation to crosstalk loss ratio (ACR) are given for discrete frequencies only. Transmission requirements shall however be met over the whole frequency range. Requirements at intermediate frequencies shall be derived by linear interpolation between two specified frequencies on a semi-logarithmic (NEXT and ACR) or logarithmic (attenuation) scale.

6.3.2 Nominal impedance

The designed nominal impedance of a permanent link and channel shall be 100 Ω, 120 Ω, or 150 Ω.

The nominal impedance of permanent links and channels should be achieved by suitable design, and the appropriate choice of cables and connecting hardware.

The variation of the input impedance of a permanent link and channel is characterised by the return loss. The characteristic impedance of cables used in a cabling link and channel shall be in accordance with the requirements of clause 7.