

Home and building electronic systems

**Technical report 2. Guidelines for the
professional installation of twisted pair
cables class 1**

Committees responsible for this Published Document

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Contents

	Page
Committees responsible	Inside front cover
National foreword	ii
Text of CENELEC Report R105-002	2

National foreword

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English version

**Home and building electronic systems
Technical report 2
Guidelines for the professional installation of
twisted pair cables class 1**

This CENELEC Report has been prepared by Working Group 8 of CENELEC Technical Committee TC 105, Home and Building Electronic Systems. It was approved by CENELEC on 5 July 1994.

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CENELEC

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Contents

1	Introduction	3
2	Planning aspects.....	3
2.1	Different types of buildings	3
2.1.1	Home and buildings	3
2.1.2	Home	3
2.1.3	Buildings	4
2.1.4	Existing buildings	4
2.1.5	New buildings	4
2.1.6	Type of occupancy	4
2.2	Physical topology	5
2.3	Planning methodology	7
2.4	Environmental conditions and EMC	9
2.4.1	General requirements	9
2.4.2	Lightning protection	9
2.4.3	Use of earthing	9
2.4.4	Overvoltage protection	10
2.5	Electrical safety	10
2.5.1	General requirements	10
2.5.2	Power segregation	10
2.5.3	Bonding and connection of the screen	11
2.5.4	Installation using ducts and pipes	12
2.5.5	Installation in special locations	12
2.5.6	Protection of the TP Network cable against overcurrents	12
2.6	Installation equipment	12
2.6.1	Cables and use	12
2.6.2	Boxes and distribution boards	15
2.6.3	TP Network termination	15
2.7	Extensions	15
3	Electrical installation	16
3.1	Physical installation	16
3.2	Wiring testing	16
3.3	System commissioning	17
3.3.1	General requirements	17
3.3.2	Examples of testing procedures	17
3.4	Documentation	18
3.4.1	Introduction	18
3.4.2	Documentation step by step	18
3.4.3	Format of documentation	18
4	Competence and training of the installer	19
Annex A (normative)	Normative references	20
A.1	Publications explicitly referred to in this report	20
A.2	Other relevant standards	20

1 Introduction

Successful HBES operation is the end-product of good planning and thorough installation. This includes planning and designing the cable route according to the distribution of the devices, installing and testing the HBES hardware. In turn this involves taking into consideration requirements on cables, topology, installation practice, and environmental conditions.

The aim of this document is to provide a Technical Report giving Installation guidelines for the professional installation of Twisted Pair Home and Building Electronic Systems (TP HBES). It is anticipated that this document will be of use to the planners and installers, and may constitute a basis for development of codes of practices by manufacturers or associations. The document may also be of value to those intending to carry out their own installations of smaller, and simpler, installations although some of the suggestions in the document may be over restrictive in this case. Attention is drawn to the fact that, in some countries, there are restrictions on do-it-yourself (DIY) installations particularly where this involves contact with the 230 V installation.

This document has been written for communication Class 1 systems (as defined by the HBES standard EN 50090). It is nevertheless anticipated that major parts of the information herein will be also used for Class 2 systems, which will be further addressed.

Three implementations are considered for Twisted Pair Class 1: implementation 1 is BatiBUS, implementation 2 is EIB, implementation 3 is Esprit HS. This document has been written to allow the installation of one wiring system which can support the selected implementation.

2 Planning aspects

2.1 Different types of buildings

A TP HBES can be installed in domestic environments as well as in other buildings. Appropriate planning of a TP network depends on the following factors: type of building structure – size and purpose of the building, (home, commercial or light industrial environment), new or existing building, type of occupancy of the building.

2.1.1 Home and buildings

The TP network is usually used for control and command of appliances, but many devices can also require mains power supply. Therefore the TP and mains network should be installed in close vicinity. However any safety rules restricting the proximity of power and control must be observed.

In both home and buildings, indoor and outdoor installations are included. Home and building installations may differ in some applications.

2.1.2 Home

In homes, HBES applications cover several fields, such as audio/video, security, load management, comfort, appliances control, etc. Normally the network is installed in one step, but the user can install his HBES devices step by step, application by application. The number of connection points is limited.

Although the cost is a very important factor for the customer, flexibility for different applications is one of the main requirements in a house. Therefore, the dimension of the network shall be calculated and the minimum provision of cableways or even TP network cables shall be defined in advance, in such a way that a new application can be set-up without extension of cable. In addition, an appropriate number of connection points must be planned in order to allow further extension of the installation. In case of extension, the network must be accessible to allow easy addition of new attachment points.

2.1.3 Buildings

In buildings for professional or commercial use, control and monitoring is the main application. The TP HBES is generally installed in one step, except for extension, and it is mainly supported by only one network. There are a high number of connection points.

Cabling solutions depend on the building infrastructure and the type of building construction will influence on the installation cost of the network system.

Modern multi-storey buildings usually have risers between the floors that can be used for routing the cables. Modern buildings may also have T-bar suspended ceilings that are ideal for routing the cableway. However, concealed spline ceilings can give access problems. This type of building structure requires few structural changes to incorporate the system.

2.1.4 Existing buildings

It may be advantageous to consider cabling the whole building even though perhaps only a part of it is occupied.

The building owner and the other occupants should be consulted regarding this. Co-operation between parties may be of mutual benefit.

The building owner could regard it as an attractive asset for the future, enhancing its market value. For the other occupants it would provide networking capabilities at a much reduced installation cost.

The installation planner shall survey the site thoroughly, with assistance from the authorities responsible for the premises. The authority should have intimate knowledge of the existing power sources, risers, conduits, wireways, firewalls,... and provide plans and consultancy services. The planner should take into account the need for modularity for multi-tenanted buildings, as well as providing security from unauthorized access (see also EN 50090-2-1: HBES System Architecture).

2.1.5 New buildings

These provide a unique opportunity for installing a network physical infrastructure. The architect has the opportunity to provide concealed ducting to accommodate the cableways, and to provide access as required in each office.

The type of occupancy, the building construction and the need for lightning protection are major factors when designing and planning an installation since this will possibly influence the installation method of the network cabling.

2.1.6 Type of occupancy

This may have an effect on the installation of the cabling infrastructure. Outright ownership of the facilities will present the fewest restrictions.

A lease on a facility may impose a number of restrictions. Leases may permit only the building owner's personnel to install the cable or require the tenant to submit plans of the intended installation for approval.

2.2 Physical topology

The TP network must fully operate several types of topologies, according to the installation type requirements (type and size of the building but also new or retrofitting installations).

The network topology will be chosen among the following: bus, tree, star and loop. Depending on the application type, several topologies can be combined as it is shown in figure 1 (for example: combination of bus, tree, ring and star). The Esprit HS implementation recommends bus topology only.

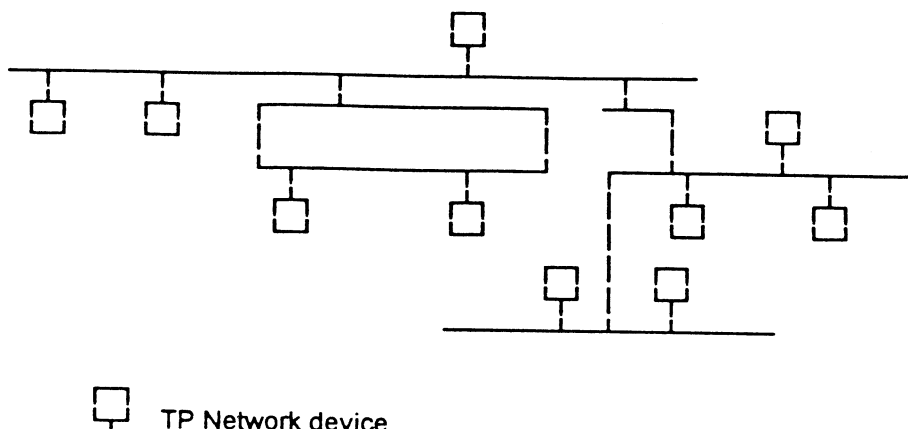


Figure 1: Example of possible topology

For a building of several floors a tree structure with a main line and one line per floor is suitable.

Some installation may be a set of buildings. In this case the installation could be based on use of several networks interconnected through gateways or bridges to a backbone network. The backbone network can be the same TP Network (EIB) or a network with a higher hierarchy level (e.g. Ethernet, Token Ring, Profibus, FIP, ISDN, etc.).

Most of the implementations may allow rings, i.e. a parallel branch within one TP Network line (see figure 1). Rings may be planned for higher availability or reliability.

Care should be taken in case of a system constituted of different networks interconnected, not to create logical loops; interconnection should be realized with the appropriate equipment, such as gateways, bridges, routers, etc. Examples of logical loops are shown in figure 2.

The effect of loops on EMC should be taken into account:

- the effect of loops on creating overvoltages in the case of lightning events strongly depends on the cross-section of the loop. In this case a loop has to be regarded in the whole building.
- the biggest risks exist for devices which are connected to different networks at the same time or are connected to the TP Network and to widely extended conducting parts.