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for telecommunication equipment in customer premises**

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## Foreword

ETSI Technical Reports (ETRs) are informative documents resulting from ETSI studies which are not appropriate for European Telecommunication Standard (ETS) or Interim European Telecommunication Standard (I-ETS) status. An ETR may be used to publish material which is either of an informative nature, relating to the use or application of ETs or I-ETs, or which is immature and not yet suitable for formal adoption as an ETS or I-ETS.

This ETR was produced by the Terminal Equipment (TE) Technical Committee with input from members of ETSI sub-Technical Committees BT2 and TM3.

Equipment safety standards EN 60950 [1] and EN 41003 [2] specify the requirements for categories of circuits as Safety Extra Low Voltage circuits (SELV-circuits), Telecommunication Network Voltage circuits (TNV-circuits) and excessive voltage circuits.

For stand-alone equipment there is no problem with the different categories of circuits. The only safety requirement for such equipment is to meet the relevant standards.

However, equipment with external interfaces is intended to be connected to other equipment, locally or via a network. In this case, the safety categories of the interfaces which will be connected together have to be compatible with each other. Furthermore, the category of the interface of the remote equipment may be unknown.

This is the case in systems where telecommunication equipment and data processing equipment are connected together via different types of interfaces and networks.

To overcome this situation, it is necessary to classify the interfaces of equipment in such configurations according to the application, and to select the safety category for the interfaces of the equipment and for the type of the network. Similarly, the interfaces have to be classified for protection against damage of the equipment and of the network. Aspects of protection are dealt with in the CCITT K.series of Recommendations.

This ETR lists a number of interfaces and indicates the safety category and protection level of each listed interface. If all interfaces comply with these levels, equipment and networks can be interconnected as intended in a co-ordinated manner.

This ETR only covers equipment appropriately interconnected. Furthermore, it does not address damage caused by one equipment to another equipment to which it is connected.

Exceptionally, interfaces may be designed for higher or lower levels for special applications. In such cases it shall be ensured that only interfaces having the same safety category and protection level are connected together. These are based on the available specifications of the equipment manufacturers and network providers, and on information regarding the installation category of the mains interface.

This ETR is a guide to the safety and protection requirements for each interface listed. For clarity and brevity it uses the style of a normative ETS, but it cannot be used for conformance testing or type approval. For these purposes, an ETS giving a more detailed specification is required for each interface and not all such ETs are yet available. This ETR does not override any published ETS.

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## 1 Scope

This ETR applies to certain equipment interfaces which are to be connected to telecommunication networks, and to similar interconnection circuits.

It applies regardless of ownership or responsibility for installation and maintenance of the equipment or network.

This ETR classifies the interfaces in two ways:

- safety categories in accordance with EN 41003 [2] and EN 60950 [1];
- protection levels according to final draft prETS 300 046 [3], final draft prETS 300 047 [4] and prETS 300 132 [5] and based on CCITT Recommendations K.20 [6], K.21 [7] and K.22 [8].

This ETR does not cover:

- TV cable distribution (CATV) systems;
- mobile radio systems;
- telecommunication facilities with remote supply using hazardous (excessive) voltage;
- radio paging systems;
- the mains system for supply, transmission and distribution of electrical power, used as a telecommunication transmission medium.

This ETR is a summary only and does not contain sufficient detail for conformance testing purposes.

If there is a conflict between this ETR and a more detailed specification, the latter prevails.

## 2 References

For the purposes of this ETR the following references apply.

- [1] CENELEC EN 60950 (1988): "Safety of information technology equipment including electrically operated business machines".
- [2] CENELEC EN 41003 (1990): "Particular safety requirements for equipment to be connected to telecommunications networks".
- [3] Final draft prETS 300 046: "Integrated Services Digital Network (ISDN); Primary rate access - safety and protection".
- [4] Final draft prETS 300 047: "Integrated Services Digital Network (ISDN); Basic access - safety and protection".
- [5] prETS 300 132: "Equipment Engineering; Power supply interface at the input to telecommunications equipments (DE/EE-2001)".
- [6] CCITT Recommendation K.20 (1988): "Resistibility of telecommunication switching equipment to overvoltages and overcurrents".
- [7] CCITT Recommendation K.21 (1988): "Resistibility of subscribers' terminals to overvoltages and overcurrents".
- [8] CCITT Recommendation K.22 (1988): "Overvoltage resistibility of equipment connected to an ISDN T/S bus".

### 3 Definitions

For the purposes of this ETR the following definitions apply.

**Safety extra-low voltage (SELV) circuit:** as given in EN 60950 [1].

**Secondary circuit:** as given in EN 60950 [1].

**Telecommunication network voltage (TNV) circuit:** as given in EN 41003 [2].

**Telecommunication signal:** as given in EN 41003 [2].

**Excessive voltage:** as given in EN 41003 [2].

### 4 Abbreviations

For the purpose of this ETR the following abbreviations apply.

CATV	TV Cable Distribution
CEPT	Conference Européenne des Administrations des Postes et des Télécommunications
CCITT	The International Telegraph and Telephone Consultative Committee
CSPDN	Circuit Switching Public Data Network
d.c.	direct current
DCE	Data Circuit-terminating Equipment
DDI	Direct Dialling in
DTE	Data Terminal Equipment
EN	European Norm
ETR	ETSI Technical Report
ETSI	European Telecommunications Standards Institute
HD	Harmonization Document
IEC	International Electrotechnical Commission
ISDN	Integrated Services Digital Network
LAN	Local Area Network
NT	Network Termination
PBX	Private Branch Exchange
PSPDN	Packet Switching Public Data Network
PSTN	Public Switched Telephone Network
TE	Terminal Equipment



## 5 Reference configuration

Figure 1 illustrates a hypothetical configuration of terminal equipment (TE) giving an example of every type of interface covered by this ETR. Other interfaces may exist for new or special applications. The central equipment is nationally a PBX, but it is a generic TE which could be a simple switch or end-user terminal. Any TE can have interfaces for the attachment of other equipment, or for power supply purposes, and not all possibilities are illustrated.

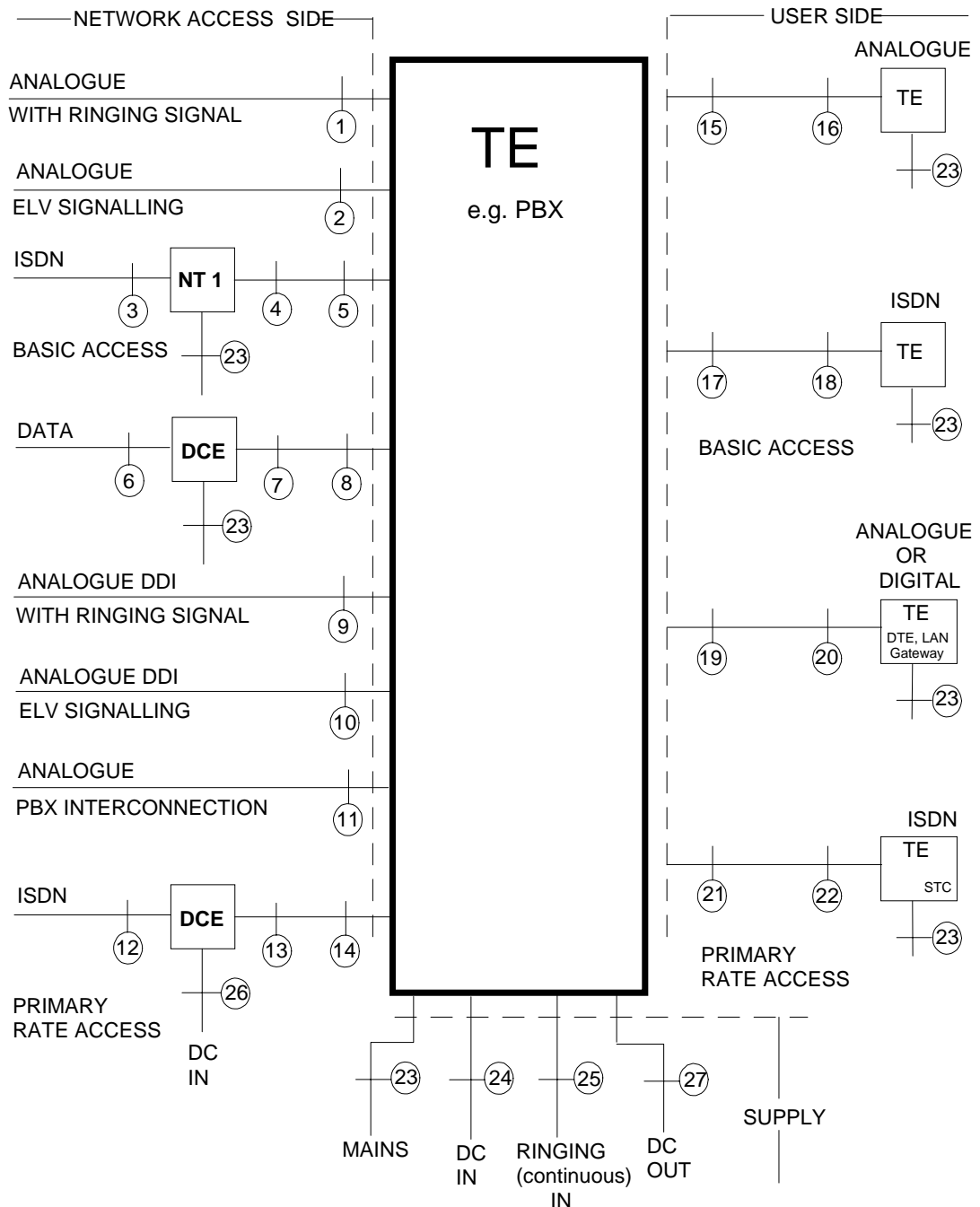


Figure 1: Reference configuration, example of a PBX

Where, in a practical situation, the TE has two or more interfaces of different types, it is normally necessary to provide safety separation within the equipment between those interfaces in accordance with EN 60950 [1] and EN 41003 [2].

Table 1 contains a brief description of the interfaces in the reference configuration. Other interfaces may exist for new or special applications.

This ETR provides a framework for safety requirements and protection levels by reference to the particular examples given in figure 1. Configurations not covered should be treated using the same principles.

**Table 1: Descriptions of interfaces**

Interface point	Description
1	Access to analogue network (PSTN) with ringing signal.
2	Access to analogue network (PSTN) with ELV signalling.
3	ISDN basic access: line side of NT1.
4	ISDN basic access: I <sub>b</sub> interface of NT1, T reference point.
5	ISDN basic access: I <sub>a</sub> interface of PBX (NT2), T reference point.
6	Access to data network (e.g. CSPDN or PSPDN).
7	Data interface: DCE-side.
8	Data interface: PBX public network side.
9	DDI access to analogue network (PSTN) with ringing signal.
10	DDI access to analogue network (PTN) with ELV signalling.
11	Analogue PBX interconnection via PTN (e.g. leaved circuit).
12	ISDN primary rate access: line side of NT1.
13	ISDN primary rate access: I <sub>b</sub> interface of NT1, T reference point.
14	ISDN primary rate access: I <sub>a</sub> interface of PBX (NT2), T reference point.
15	Analogue extension interface of PBX.
16	Analogue extension interface of TE.
17	ISDN basic access: I <sub>b</sub> interface of PBX (NT2), S reference point.
18	ISDN basic access: I <sub>a</sub> interface of TE, S reference-point.
19	Analogue or digital extension interface of PBX.
20	Analogue or digital, interface of TE (DTE, gateway, LAN, etc).
21	ISDN primary rate access: I <sub>b</sub> interface of PBX (NT2), S reference point.
22	ISDN primary rate access: I <sub>a</sub> interface of TE, etc.
23	Supply interface: mains.
24	Supply interface: d.c. input.
25	Supply interface: ringing (continuous).
26	d.c. supply in for primary rate access NT1.
27 1)	d.c. supply out for primary rate access NT1.

1) This source may be a separate unit, not part of the TE.

## 6 Safety categories

The safety categories, and the applicability of certain subclauses that do not apply to every interface, are given in table 2 for each of the interfaces listed in table 1.

### 6.1 SELV-circuits

The requirements for SELV-circuits are as specified in EN 60950 [1] for normal conditions and subclause 2.3.3 for single fault conditions.

Exceptionally under conditions specified in EN 41003 [2], subclause 4.2, a SELV-circuit is permitted to exceed the limits of EN 60950 [1], subclause 2.3.3 in the event of a single fault, provided that it does not exceed the limits of EN 41003 [2], subclauses 3.2.1 and 3.2.2 [1].

### 6.2 Mains installation categories

Installation category II as specified in IEC 664 is assumed. For higher installation categories additional measures may be required.

### 6.3 Separation requirements between SELV-circuits and TNV-circuits

According to subclauses 4.2.1 and 4.2.2 of EN 41003 [2] (see also subclause 4.1).

#### 6.4 Limitation of leakage current to ISDN interfaces

To protect the user and service personnel, the touch current on ISDN interfaces has to be limited to a safe value. Appropriate tests are to be specified in the equipment interface standards. Limitation of leakage current on other interfaces is for further study.

**Table 2: Assigned safety categories**

Interface point	Interface safety category (TNV circuit, SELV circuit or excessive voltage)	Applicable subclauses				Relevant standard
		2.3.6 of EN 60950 [1] 1)	4.5 of EN 41003 [2] 2)	6.5 of this ETR 3)	4.4.2 of EN 41003 [2] 4)	
1	TNV		yes	no	yes	
2	SELV	n.p.	yes	no	yes	
3	5)					
4	SELV	n.p.	no	yes	no	prETS 300 047-4 [4]
5	SELV	n.p.	no	yes	no	prETS 300 047-2 [4]
6	5)					
7	SELV		no	no	no	7)
8	SELV		no	no		
9	TNV		yes	f.s.	yes	
10	SELV	n.p.	yes	no	yes	
11	TNV		yes	f.s.	yes	
12	5)					
13	SELV		no	yes	no	prETS 300 046-4 [3]
14	SELV		no	yes	no	prETS 300 046-2 [3]
15	TNV 3)		no	f.s.	yes	
16	TNV 3)		yes	f.s.	yes	
17	SELV		no	yes	no	prETS 300 047-4 [4]
18	SELV	n.p.	no	yes	no	prETS 300 047-2 [4]
19	SELV		no	no	no	
20	SELV		no	no	no	
21	SELV		no	yes	no	prETS 300 046-4 [3]
22	SELV		no	yes	no	prETS 300 046-2 [3]
23	excessive		no	n.a.	n.a.	
24	SELV 8)		no	n.a.	no	
25	excessive 8)		no	n.a.	no	
26	SELV	n.a.	no	no	no	
27	SELV		no	no	no	

f.s. further study required  
 n.a. not applicable  
 n.p. not permitted

1) SELV circuit using basic insulation plus protective earth. For certain interface circuits that are not allowed to be earthed, primarily for functional reasons, this method is not permitted.  
 2) Safety of equipment users from voltages on the telecommunication network.  
 3) Leakage current measurement for ISDN S/T bus. This test is additional to those in EN 41003 [2] and EN 60950 [1], and details are given in the relevant standard.  
 4) Earthing of pluggable equipment type A.  
 5) The electrical characteristics at this interface may differ from one application to another. Safety requirements depend on these characteristics and no standards exist.  
 6) Application of 4.4.2 of EN 41003 [2] is considered to be appropriate in principle for this interface, but as presently worded it is over-severe, and it is not used. Proposals are under study to modify the requirements of 4.4.2 appropriately.  
 7) Application of 4.4.2 of EN 41003 [2] is not used for this interface, but the matter is under study, including the possibility of changes to 4.4.2.  
 8) May be a TNV circuit, depending on the voltage.

## 7 Protection requirements

The applicable requirements for protection of the equipment from overvoltages arriving at each of the interfaces listed in table 1 are given in table 3.

Detailed test specifications for many of the interfaces are for further study.

**Table 3: Applicable protection against damage.**

Interface point	Protection requirement
1	based on K.21 [7]
2	based on K.21 [7]
3	based on K.21 [7]
4	based on K.22 [8]
5	based on K.22 [8]
6	based on K.21 [7]
7	for further study
8	for further study
9	based on K.21 [7]
10	based on K.21 [7]
11	based on K.21 [7]
12	based on K.21 [7]
13	based on K.22 [8]
14	based on K.22 [8]
15	based on K.20 [6] 1)
16	based on K.21 [7] 1)
17	based on K.22 [8]
18	Based on K.22 [8]
19	for further study
20	for further study
21	based on K.22 [8]
22	based on K.22 [8]
23	based on K.22 [8]
24	see prETS 300 132 [5]
25	not relevant
26 2)	based on K.22 [8]
27	based on K.22 [8]
NOTE 1: For analogue interfaces with restricted applications, lower levels are under study.	
NOTE 2: Uses the same wiring path as interface points 21 and 22.	

## **Annex A (informative): Bibliography**

1. HD 384 (IEC 364): "Electrical installation of buildings".
2. IEC 664 (1980) and 664A (1981): "Insulation co-ordination within low voltage systems including clearances and creepage distances for equipment".
3. CCITT Recommendation K.11 (1988): "Principles of protection against overvoltages and overcurrents".
4. CCITT Recommendation K.17 (1988): "Test on power-fed repeaters using solid-state devices in order to check the arrangements for protection from external interference".

## History

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