

BS EN 50468:2009



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Resistibility requirements to overvoltages and overcurrents due to lightning for equipment having telecommunication ports

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**Resistibility requirements to overvoltages and overcurrents
due to lightning for equipment having telecommunication ports**

Exigences de tenue
aux surtensions et aux surintensités
dues à la foudre pour les matériels
avec port de communication

Anforderungen zur Zerstörfestigkeit
von Einrichtungen
mit Telekommunikationsanschluss
gegen Überspannungen
und -ströme infolge Blitzschlags

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CENELEC

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

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Foreword

This European Standard was prepared by the Technical Committee CENELEC TC 81X, Lightning protection.

The text of the draft was submitted to the formal vote and was approved by CENELEC as EN 50468 on 2009-02-01.

The following dates were fixed:

- latest date by which the EN has to be implemented
at national level by publication of an identical
national standard or by endorsement (dop) 2010-02-01
 - latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2012-02-01
-

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1 Scope

This European Standard specifies the minimum level of resistibility of equipment having telecommunication port(s) to overvoltages and overcurrents.

This European Standard covers telecommunication equipment installed at customer premises as shown in Figure 1.

Overvoltages or overcurrents covered by this European Standard are surges due to direct or indirect lightning on the telecommunication line plant.

Overvoltages or overcurrent not covered by this European Standard are

- short-term induction of alternating voltages from electric power systems (including electrified railway),
- earth potential rise due to power faults or load switching,
- direct contacts between telecommunication lines and low voltage power lines.

This European Standard is intended for use by network (public/private) operators and the equipment manufacturers.

This European Standard applies to equipment having telecommunication port(s) connected to external conductors, i.e. conductor located outside the customer's building.

The tests are type tests and, although they are applicable to a complete system, it is recognised that they may be applied to individual items of equipment during development and design work.

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.

CLC/TR 50450:2006, Resistibility requirements for equipment having (a) telecommunication port(s)

EN 60950-1:2006, Information technology equipment – Safety – Part 1: General requirements (IEC 60950-1:2005, mod.)

IEC 60050-701:1988, International Electrotechnical Vocabulary (IEV) – Chapter 701: Telecommunications, channels and networks

ITU-T Recommendation K.21, Resistibility of telecommunication equipment installed in customer premises to overvoltages and overcurrents

ITU-T Recommendation K.44, Resistibility tests for telecommunication equipment exposed to overvoltages and overcurrents – Basic Recommendation

3 Terms, definitions and abbreviations

For the purposes of this document, the following terms and definitions apply, in addition with those definitions and abbreviations in ITU-T recommendation K.44.

3.1

resistibility

ability of telecommunication equipment or installations to withstand, in general without damage, the effects of overvoltages or overcurrents, up to a certain, specified extent, and in accordance with a specified criterion

[ITU-T K.44]

NOTE Two acceptance criteria are recognized:

Criterion A – Equipment shall withstand the test without damage or other disturbance (such as corruption of software or misoperation of fault-protection facilities) and shall operate properly within the specified limits after the test. It is not required to operate correctly during the test.

Criterion B – A fire hazard shall not arise in the equipment as a result of the tests. Any damage, if it occurs, shall be confined to a small part of the equipment.

3.2

telecommunication port

port which is intended to be connected to telecommunication networks, Local Area Networks (e.g. Ethernet, Token Ring) and similar networks, either through physical connection (cable optical fibre) or radio connection

[CLC/TR 50450]

NOTE In the latter case the antenna port is the telecommunication port.

3.3

external ports

particular interface of the specified equipment, which is directly connected to metallic conductors extending beyond the building or shelter boundary

[ITU-T K.44]

3.4

internal ports

particular interface of the specified equipment which is connected to metallic conductors which do not leave the building or shelter. These interfaces connect to cables which interconnect system blocks

[ITU-T K.44]

3.5

telecommunication

any transmission, emission or reception of signs, signals, writing, images and sounds or intelligence of any nature by wire, radio, optical or other electromagnetic systems

[IEV 701-01-05 of IEC 60050-701:1988]

4 Reference configuration

The diagram below shows equipment with telecommunication port(s) installed at customers premises. This ensures that the appropriate electromagnetic environment for the installation is considered, independent of the ownership of the equipment.

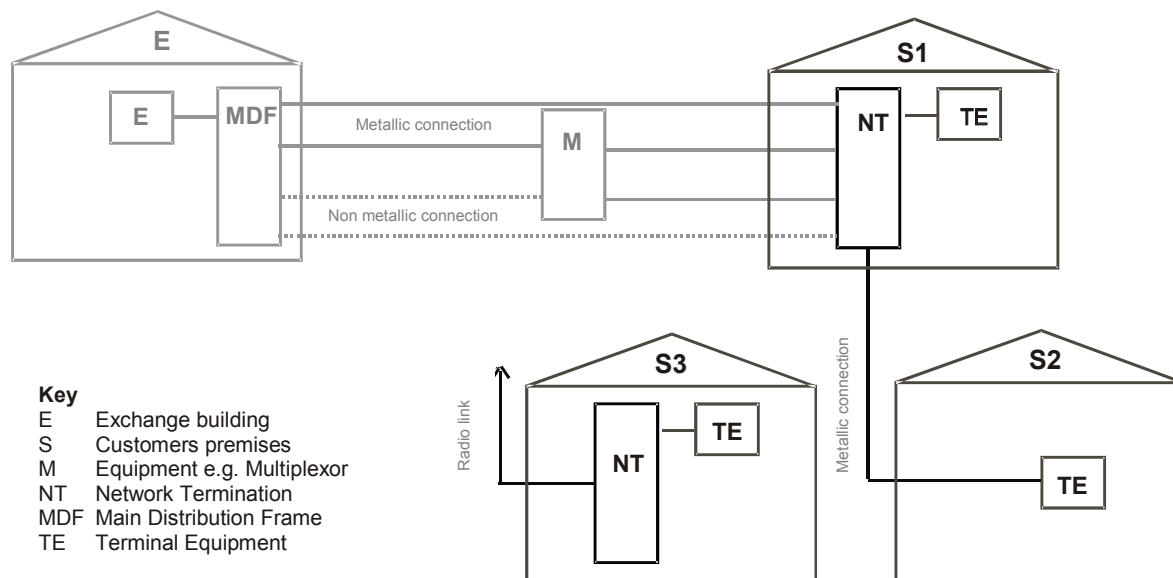


Figure 1 – Equipment with telecommunication ports installed at customers premises

5 Resistibility requirements

For equipment having only external telecommunications ports the resistibility requirements are defined in ITU-T K.21, "Basic test level". See also Figure 2, a).

For equipment having additional connections to networks, e.g. power networks, the test levels are defined in ITU-T K.21, "Enhanced test level". See also Figure 2, b) to e).

The inherent resistibility of the equipment may not be sufficient by itself, requiring co-ordinated primary protection to be fitted to fully comply.

NOTE For the external port, the probability of overvoltages and overcurrents on the equipment is determined by

- the length of the line and the environment it is installed in,
- the environment outside of the structure, and the structure itself.

6 Resistibility test requirements

An overview of the test conditions for the different ports is shown in 6.1 to 6.3. See also Figure 2 for identification of the ports. In Annex A is listed the relevant ITU specifications on this topic.

The complete test requirements, test generators, test circuits, test conditions, coupling and decoupling elements and port terminations are provided in ITU-T K.21 and K.44.

During test the level of overvoltages and overcurrents in untested ports shall not exceed the requirements in EN 60950-1.

Gas discharge tubes with 600 V nominal d.c. spark-over voltage are used as special test protector in the co-ordination test on external telecommunication port(s).

6.1 For ports connected to balanced copper cabling

6.1.1 Lightning test conditions for ports connected to external balanced copper cabling

Test No.	Test No. ITU-T K.21	Test description ITU-T K.21	Basic test levels	Enhanced test levels
6.1.1.1	2.1.1.a	Single port, lightning, inherent, transverse	$U_{c(max)} = 1,5 \text{ kV}$	$U_{c(max)} = 1,5 \text{ kV}$
6.1.1.2	2.1.1.b	Single port, lightning, inherent, port to earth	$U_{c(max)} = 1,5 \text{ kV}$	$U_{c(max)} = 6 \text{ kV}$
6.1.1.3	2.1.1.c	Single port, lightning, inherent, port to external port	$U_{c(max)} = 1,5 \text{ kV}$	$U_{c(max)} = 6 \text{ kV}$
6.1.1.4	2.1.2.a	Single port, lightning, coordination, transverse	$U_{c(max)} = 4 \text{ kV}$	$U_{c(max)} = 6 \text{ kV}$
6.1.1.5	2.1.2.b	Single port, lightning, coordination, port to earth	$U_{c(max)} = 4 \text{ kV}$	$U_{c(max)} = 6 \text{ kV}$
6.1.1.6	2.1.2.c	Single port, lightning, coordination, port to external port	$U_{c(max)} = 4 \text{ kV}$	$U_{c(max)} = 6 \text{ kV}$
6.1.1.7	2.1.3.a	Multiple port, lightning, inherent, port to earth	$U_{c(max)} = 1,5 \text{ kV}$	$U_{c(max)} = 1,5 \text{ kV}$
6.1.1.8	2.1.3.b	Multiple port, lightning, inherent, port to external port	$U_{c(max)} = 1,5 \text{ kV}$	$U_{c(max)} = 1,5 \text{ kV}$
6.1.1.9	2.1.4.a	Multiple port, lightning coordination, port to earth	$U_{c(max)} = 4 \text{ kV}$	$U_{c(max)} = 6 \text{ kV}$
6.1.1.10	2.1.4.b	Multiple port, lightning coordination, port to external port	$U_{c(max)} = 4 \text{ kV}$	$U_{c(max)} = 6 \text{ kV}$
6.1.1.11	2.1.5.a	Single port, lightning current, port to earth	$I = 1 \text{ kA/wire}$	$I = 5 \text{ kA/wire}$
6.1.1.12	2.1.5.b	Single port, lightning current, port to external port	$I = 1 \text{ kA/wire}$	$I = 5 \text{ kA/wire}$
6.1.1.13	2.1.6.a	Multiple port, lightning current, port to earth	$I = 1 \text{ kA/wire}$ Limited to 6 kA total	$I = 5 \text{ kA/wire}$ Limited to 30 kA total
6.1.1.14	2.1.6.b	Multiple port, lightning current, port to external port	$I = 1 \text{ kA/wire}$ Limited to 6 kA total ^a	$I = 5 \text{ kA/wire}$ Limited to 30 kA total ^a

^a Peak current is set by the weaker of the port under test and the external port coupled to ground.

6.2 For ports connected to external d.c or a.c dedicated power feeding cables

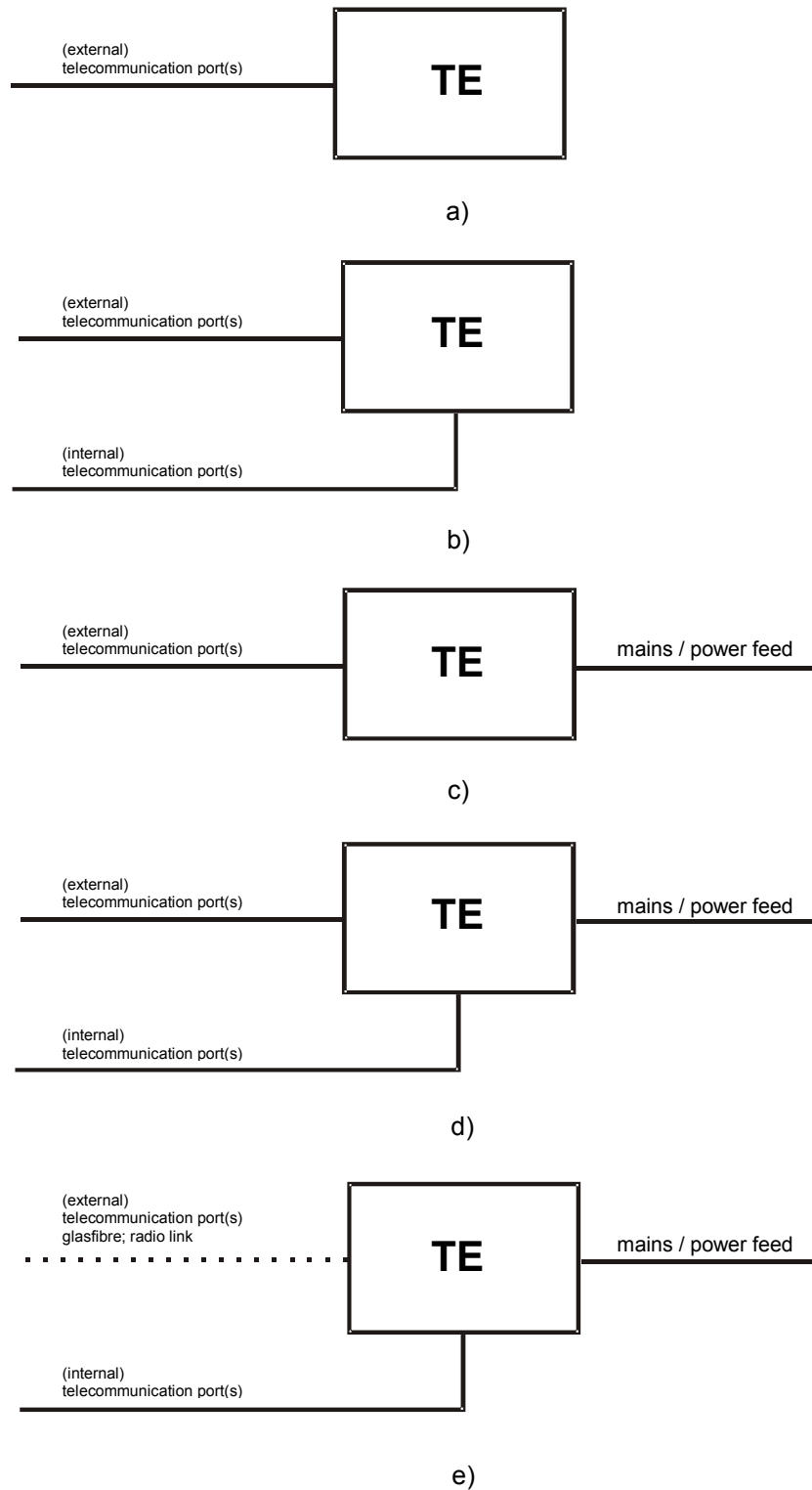
6.2.1 Lightning test conditions for ports connected to external d.c or a.c dedicated power feeding cables

Test No.	Test No. ITU-T K.21	Test description ITU-T K.21	Basic test levels	Enhanced test levels
6.2.1.1	4.1.1.a	Single port, lightning, inherent, transverse	$U_{c(max)} = 1,5 \text{ kV}$	$U_{c(max)} = 1,5 \text{ kV}$
6.2.1.2	4.1.1.b	Single port, lightning, inherent, port to earth	$U_{c(max)} = 1,5 \text{ kV}$	$U_{c(max)} = 6 \text{ kV}$
6.2.1.3	4.1.1.c	Single port, lightning, inherent, port to external port	$U_{c(max)} = 1,5 \text{ kV}$	$U_{c(max)} = 6 \text{ kV}$
6.2.1.4	4.1.2.a	Single port, lightning, coordination, transverse	$U_{c(max)} = 4 \text{ kV}$	$U_{c(max)} = 6 \text{ kV}$
6.2.1.5	4.1.2.b	Single port, lightning, coordination, port to earth	$U_{c(max)} = 4 \text{ kV}$	$U_{c(max)} = 6 \text{ kV}$
6.2.1.6	4.1.2.c	Single port, lightning, coordination, port to external port	$U_{c(max)} = 4 \text{ kV}$	$U_{c(max)} = 6 \text{ kV}$
6.2.1.7	4.1.5.a	Single port, lightning current, port to earth	$I = 1 \text{ kA/wire}$	$I = 5 \text{ kA/wire}$
6.2.1.8	4.1.5.b	Single port, lightning current, port to external port	$I = 1 \text{ kA/wire}$	$I = 5 \text{ kA/wire}$

6.3 For mains power ports

6.3.1 Test conditions for mains power ports

Test No.	Test No. ITU-T K.21	Test description ITU-T K.21	Basic test levels	Enhanced test levels
6.3.1.1	5.1.1.a	Lightning, inherent, transverse	$U_{c(max)} = 2,5 \text{ kV}$	$U_{c(max)} = 6 \text{ kV}$
6.3.1.2	5.1.1.b	Lightning, inherent, port to earth	$U_{c(max)} = 2,5 \text{ kV}$	$U_{c(max)} = 6 \text{ kV}$
6.3.1.3	5.1.1.c	Lightning, inherent, mains port to external port	$U_{c(max)} = 2,5 \text{ kV}$	$U_{c(max)} = 6 \text{ kV}$
6.3.1.4	5.1.2.a	Lightning, coordination, transverse	$U_{c(max)} = 6 \text{ kV}$	$U_{c(max)} = 10 \text{ kV}$
6.3.1.5	5.1.2.b	Lightning, coordination, port to earth	$U_{c(max)} = 6 \text{ kV}$	$U_{c(max)} = 10 \text{ kV}$
6.3.1.6	5.1.2.c	Lightning, coordination, mains port to external port	$U_{c(max)} = 6 \text{ kV}$	$U_{c(max)} = 10 \text{ kV}$



Key

TE Terminal Equipment

Figure 2 – TE configurations

Annex A
(informative)

ITU-T publications (K-recommendations) with relation to TE

Lightning protection

K.11 General
K.25 Optical fibre cables
K.46, K.47 Metallic cables
K.44 Basics, Resistibility tests
Lightning handbook

Lightning protection

none

Mains induced

K.11 Principles
K.26 Protection
K.44 Basics, Resistibility tests
K.53 Values of induced voltages
K.54 Test methods
Directive 1999/5/EC

Mains induced

n.a.

Surge protection devices

K.12 GDT
K.26 Protection
K.28 Semi-conductor protectors
K.30 PTC
K.36 Selection of SPD
Directive 1999/5/EC

Surge protection devices

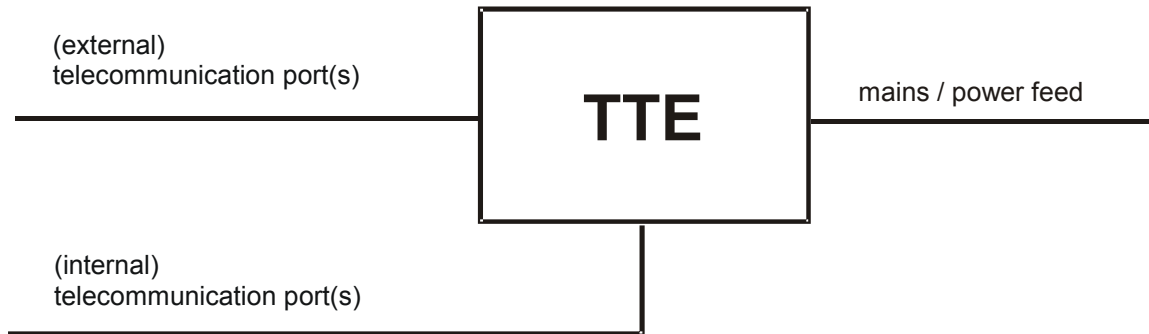
none

Resistibility requirements

K.21 Customers equipment

Resistibility requirements

K.21 Customers equipment



Key

TTE Telecommunication Terminal Equipment

Figure A.1 – ITU-T publications (K-recommendations) with relation to TE

Bibliography

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

EN 50174-2, Information technology – Cabling installation – Part 2: Installation planning and practices inside buildings

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

EN 61663-2, Lightning protection – Telecommunication lines – Part 2: Lines using metallic conductors (IEC 61663-2)

ITU-T Recommendation K.11, Principles of protection against overvoltages and overcurrents

ITU-T Recommendation K.12, Characteristics of gas discharge tubes for the protection of telecommunications installations

ITU-T Recommendation K.25, Protection of optical fibre cables

ITU-T Recommendation K.26, Protection of telecommunication lines against harmful effects from electric power and electrified railway lines

ITU-T Recommendation K.28, Characteristics of semi-conductor arrester assemblies for the protection of telecommunications installations

ITU-T Recommendation K.30, Self-restoring overcurrent protectors

ITU-T Recommendation K.36, Selection of protective devices

ITU-T Recommendation K.46, Protection of telecommunication lines using metallic symmetric conductors against lightning-induced surges

ITU-T Recommendation K.47, Protection of telecommunication lines using metallic conductors against direct lightning discharges

ITU-T Recommendation K.53, Values of induced voltages on telecommunication installations to establish telecom and a.c. power and railway operators responsibilities

ITU-T Recommendation K.54, Conducted immunity test method and level at fundamental power frequencies

ITU-T Recommendation K.66, Protection of customer premises from overvoltages

Directive 1999/5/EC, RTTE – Radio Equipment and Telecommunications Terminal Equipment and the mutual recognition of their conformity

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