

I n t e r n a t i o n a l T e l e c o m m u n i c a t i o n U n i o n

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

K.45

(07/2017)

SERIES K: PROTECTION AGAINST INTERFERENCE

Resistibility of telecommunication equipment installed in the access and trunk networks to overvoltages and overcurrents

Recommendation ITU-T K.45

ITU-T K.45 (07/2017)

ITU-T



Documents

International
Telecommunication
Union
Document Sharing Hub

Document ID: 123456789

Recommendation ITU-T K.45

Resistibility of telecommunication equipment installed in the access and trunk networks to overvoltages and overcurrents

Summary

Recommendation ITU-T K.45 specifies resistibility requirements and test procedures for telecommunication equipment installed between telecommunication centres and between a telecommunication centre and the customer's premises.

Overvoltages or overcurrents covered by this Recommendation include surges due to lightning on or near the line plant, short-term induction from adjacent a.c. power lines or railway systems, earth potential rise due to power faults, direct contact between telecommunication lines and power lines, and electrostatic discharges.

Major changes compared with Recommendation ITU-T K.45 (2013) include:

- adding test requirements for unshielded twisted pair Ethernet ((UTP_E));
- adding test requirements for shielded twisted pair Ethernet (STP_E);
- adding test requirements for power over Ethernet (PoE);
- adding STP_E shield testing.

History

Edition	Recommendation	Approval	Study Group	Unique ID*
1.0	ITU-T K.45	2000-02-25	5	11.1002/1000/4908
2.0	ITU-T K.45	2003-07-29	5	11.1002/1000/6497
3.0	ITU-T K.45	2008-04-13	5	11.1002/1000/9404
4.0	ITU-T K.45	2011-11-13	5	11.1002/1000/11423
5.0	ITU-T K.45	2015-04-22	5	11.1002/1000/12407
6.0	ITU-T K.45	2016-06-29	5	11.1002/1000/12870
7.0	ITU-T K.45	2016-12-14	5	11.1002/1000/13129
8.0	ITU-T K.45	2017-07-29	5	11.1002/1000/13274

Keywords

1.2/50-8/20, 10/700, access equipment, common mode, differential, external port, internal port, longitudinal, overcurrent, overvoltage, power contact, power induction, resistibility, surges, telecommunication equipment, transverse, trunk.

* To access the Recommendation, type the URL <http://handle.itu.int/> in the address field of your web browser, followed by the Recommendation's unique ID. For example, <http://handle.itu.int/11.1002/1000/11830-en>.

FOREWORD

The International Telecommunication Union (ITU) is the United Nations specialized agency in the field of telecommunications, information and communication technologies (ICTs). The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of ITU. ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSA Resolution 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

Compliance with this Recommendation is voluntary. However, the Recommendation may contain certain mandatory provisions (to ensure, e.g., interoperability or applicability) and compliance with the Recommendation is achieved when all of these mandatory provisions are met. The words "shall" or some other obligatory language such as "must" and the negative equivalents are used to express requirements. The use of such words does not suggest that compliance with the Recommendation is required of any party.

INTELLECTUAL PROPERTY RIGHTS

ITU draws attention to the possibility that the practice or implementation of this Recommendation may involve the use of a claimed Intellectual Property Right. ITU takes no position concerning the evidence, validity or applicability of claimed Intellectual Property Rights, whether asserted by ITU members or others outside of the Recommendation development process.

As of the date of approval of this Recommendation, ITU had not received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementers are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database at <http://www.itu.int/ITU-T/ipr/>.

© ITU 2017

All rights reserved. No part of this publication may be reproduced, by any means whatsoever, without the prior written permission of ITU.

Table of Contents

	Page
1 Scope.....	1
2 References.....	1
3 Definitions	1
3.1 Terms defined elsewhere	1
3.2 Terms defined in this Recommendation.....	1
4 Abbreviations and acronyms	1
5 Conventions	2
6 Tests.....	2
Bibliography.....	22

Recommendation ITU-T K.45

Resistibility of telecommunication equipment installed in the access and trunk networks to overvoltages and overcurrents

1 Scope

This Recommendation specifies resistibility requirements and test procedures for telecommunication equipment installed between telecommunication centres and between a telecommunication centre and the customer's premises. Equipment which is attached to or installed within the customer's premises is outside the scope of this Recommendation. [ITU-T K.44], covering basic test methods and test circuits, is an integral part of this Recommendation. It should be read in conjunction with [ITU-T K.11] and [ITU-T K.39] (technical and general economic aspects of protection).

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

- | | |
|-----------------|--|
| [ITU-T K.11] | Recommendation ITU-T K.11 (2009), <i>Principles of protection against overvoltages and overcurrents</i> . |
| [ITU-T K.39] | Recommendation ITU-T K.39 (1996), <i>Risk assessment of damages to telecommunication sites due to lightning discharges</i> . |
| [ITU-T K.44] | Recommendation ITU-T K.44 (2017), <i>Resistibility tests for telecommunication equipment exposed to overvoltages and overcurrents – Basic Recommendation</i> . |
| [IEC 61000-4-2] | IEC 61000-4-2:2008, <i>Electromagnetic compatibility (EMC) – Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test</i> . |

3 Definitions

3.1 Terms defined elsewhere

Definitions used in this Recommendation are defined in [ITU-T K.44].

3.2 Terms defined in this Recommendation

None.

4 Abbreviations and acronyms

This Recommendation uses the abbreviations and acronyms defined in [ITU-T K.44] as well as the following:

CWG	Combination Wave Generator
ESD	Electrostatic Discharge
PoE	Power over Ethernet
STP	Special Test Protector

STP_E Shielded Twisted Pair Ethernet
UTP_E Unshielded Twisted Pair Ethernet

5 Conventions

This Recommendation uses the conventions defined in [ITU-T K.44] as well as the following:

- IT Designation specified in [b-IEC 60364] for a power distribution system in which there is no point connected with earth (isolation), except perhaps via a high impedance, on the power-supply equipment (generator or transformer) and a direct connection of a point on the electrical device being supplied with earth.
- TT Designation specified in [b-IEC 60364] for a power distribution system in which there is a direct connection of a point on the power-supply equipment (generator or transformer) with earth and a direct connection of a point on the electrical device being supplied with earth.

6 Tests

A summary of the applicable tests is given in Table 1. The numbers given in the "port type" columns, e.g., 2.2.1.a, refer to the "Test No." of Tables 2 to 5. The words "under study" mean that ITU-T is still studying this test. The test conditions applicable to the four ports (symmetric, coaxial, dedicated power feed and mains power) are given in Tables 2 to 5. The test conditions for electrostatic discharge (ESD) are given in Table 6. For information on the headings and terms used in the tables, refer to clause 10 of [ITU-T K.44].

Refer to clause 5.2 of [ITU-T K.44] on selecting the enhanced resistibility requirement.

NOTE 1 – The port to external port test for the basic test level does not apply when the equipment is designed to be always used with a connection to earth.

NOTE 2 – The external port test applies to ports used to connect externally attached equipment to equipment installed within the same building. The mains power contact test does not apply in this situation.

NOTE 3 – The power induction test does not apply to ports used to connect to antennas installed under the scope of [b-ITU-T K.71].

Table 1 – Applicable tests

Test type	No. of pairs simultaneously tested	Test connection	Primary protection	Port type			
				Symmetric port	Coaxial port	Dedicated power feed port	Mains power port
Lightning voltage	Single	Transverse/differential	No	2.1.1a	3.1.1	4.1.1a	5.1.1a
		Port to earth	No	2.1.1b	n/a	4.1.1b	5.1.1b
		Port to external port	No	2.1.1c	n/a	4.1.1c	5.1.1c
		Coordination/Transverse/differential	Yes	2.1.2a	3.1.2	4.1.2a	5.1.2a
		Coordination/Port to earth	Yes	2.1.2b	n/a	4.1.2b	5.1.2b
		Coordination/Port to external port	Yes	2.1.2c	n/a	4.1.2c	5.1.2c
	Multiple	Port to earth	No	2.1.3a	n/a	n/a	n/a
		Port to external port	No	2.1.3b	n/a	n/a	n/a
		Port to earth	Yes	2.1.4a	n/a	n/a	n/a
		Port to external port	Yes	2.1.4b	n/a	n/a	n/a
	Unshielded twisted pair Ethernet (UTP _E)	Port to Earth	No	2.1.8	n/a	n/a	n/a
		Transverse	No	2.1.7	n/a	n/a	n/a
		Voltage impulse test	No	2.1.10	n/a	n/a	n/a
		Power over Ethernet (PoE)	No	2.1.11	n/a	n/a	n/a
	Shielded twisted pair Ethernet (STP _E)	Port to Earth	No	2.1.8		n/a	n/a
		Shield to earth	No	2.1.9		n/a	n/a
Lightning current	Single	Port to earth	No	2.1.5a	n/a	4.1.5a	n/a
		Port to external port	No	2.1.5b	n/a	4.1.5b	n/a
		Differential	n/a	n/a	3.1.3	n/a	n/a
		Shield to earth	n/a	n/a	3.1.4	n/a	n/a
		Shield to external port	n/a	n/a	3.1.5	n/a	n/a
	Multiple	Port to earth	No	2.1.6a	n/a	n/a	n/a
		Port to external port	No	2.1.6b	n/a	n/a	n/a