

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

Series K

Supplement 21

(10/2020)

SERIES K: PROTECTION AGAINST INTERFERENCE

Rationale for setting resistibility requirements of telecommunication equipment installed in customer premises against lightning

ITU-T K-series Recommendations – Supplement 21

Supplement 21 to ITU-T K-series Recommendations

Rationale for setting resistibility requirements of telecommunication equipment installed in customer premises against lightning

Summary

Supplement 21 to ITU-T K-series Recommendations includes the technical information (rationale) on resistibility against lightning contained in Recommendation ITU-T K.21, "*Resistibility of telecommunication equipment installed in customer premises to overvoltages and overcurrents*".

History

Edition	Recommendation	Approval	Study Group	Unique ID*
1.0	ITU-T K Suppl. 21	2020-10-23	5	11.1002/1000/14579

Keywords

ITU-T K.21, ITU-T K.44, customer premises, lightning, resistibility, telecommunication equipment.

* 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

This is an informative ITU-T publication. Mandatory provisions, such as those found in ITU-T Recommendations, are outside the scope of this publication. This publication should only be referenced bibliographically in ITU-T Recommendations.

INTELLECTUAL PROPERTY RIGHTS

ITU draws attention to the possibility that the practice or implementation of this publication 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 publication development process.

As of the date of approval of this publication, ITU had not received notice of intellectual property, protected by patents, which may be required to implement this publication. 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 2021

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	2
3.1 Terms defined elsewhere	2
3.2 Terms defined in this Supplement	2
4 Abbreviations and acronyms	2
5 Conventions	2
6 Rationale	2
6.1 Ports connected to external cables.....	4
6.2 Ports connected to internal cables	13
7 Addition of rationale to this Supplement.....	15

Supplement 21 to ITU-T K-series Recommendations

Rationale for setting resistibility requirements of telecommunication equipment installed in customer premises against lightning

1 Scope

This Supplement provides technical information (rationale) for setting the resistibility requirements against lightning contained in [ITU-T K.21]. This information should be referred to in the case of revision of [ITU-T K.21]. The rationale described in this Supplement is mainly quoted from past contributions and other documents discussed in ITU-T SG5 at the stage of establishment and revision of [ITU-T K.21].

This is a living document in that the rational justifying any future changes in Recommendation ITU-T K.21 testing should be added to this Supplement.

This Supplement references the tables, test numbers and test conditions found in [ITU-T K.21]. Rational information for the [ITU-T K.21] test values originates from various events, surveys, standards and ITU-T SG5 contributions.

2 References

- [ITU-T K.21] Recommendation ITU-T K.21 (2019), *Resistibility of telecommunication equipment installed in customer premises to overvoltages and overcurrents*.
- [ITU-T K.44] Recommendation ITU-T K.44 (2019), *Resistibility tests for telecommunication equipment exposed to overvoltages and overcurrents – Basic Recommendation*.
- [ITU-T K.66] Recommendation ITU-T K.66 (2019), *Protection of customer premises from overvoltages*.
- [ITU-T K.98] Recommendation ITU-T K.98 (2014), *Overvoltage protection guide for telecommunication equipment installed in customer premises*.
- [ITU-T K.143] Recommendation ITU-T K.143 (2019), *Guidance on safety relating to the use of surge protective devices and surge protective components in telecommunication terminal equipment*.
- [IEC 60664-1] IEC 60664-1:2020, *Insulation Coordination For Equipment Within Low-Voltage Systems – Part 1: Principles, Requirements and Tests*.
- [IEC 60950-1] IEC 60950-1:2001, *Information technology equipment – Safety – Part 1: General requirements*.
- [Handbook] Handbook *The Protection of Telecommunication Lines and Equipment Against Lightning Discharges* – Chapters 9 and 10, ITU-T, 1995.
- [Miyazaki] Teru Miyazaki, Shigemitsu Okabe, Kiyoshi Aiba, Takao Hirai, Jun Yoshinaga, *A Lightning Surge Analysis for the Rationalization of the Ground System in Power Distribution Lines*, IEEJ Trans. PE, Vol. 127, No.2, 2007.
- [Taguchi] *Lightning Surge Waves Induced in Transmission Lines*, Hiroaki Koga, Tamio Motomitsu, Morihiko Taguchi, Review of the Electrical Communication Laboratories, Volume 29, Numbers 7-8, July-August, 1981.

3 Definitions

3.1 Terms defined elsewhere

This Supplement uses terms defined in [ITU-T K.21].

3.2 Terms defined in this Supplement

None.

4 Abbreviations and acronyms

This Supplement uses the following abbreviations and acronyms:

a.c. Alternating Current

CWG Combination Wave Generator

d.c. Direct Current

dpf Dedicated Power Feed

n/a Not Applicable

PoE Power over Ethernet

STP_E Ethernet Shielded Twisted Pair

USB Universal Serial Bus

UTP_E Ethernet Unshielded Twisted Pair

5 Conventions

None.

6 Rationale

Table 1a and Table 1b, adapted from [ITU-T K.21], show references to clause numbers containing the rationale with each test number in [ITU-T K.21]. These tables (Table 1a and Table 1b) have the same table structure as Table 1a and Table 1b of [ITU-T K.21], for external ports and internal ports respectively.

Table 1a – Reference to rationale for each test item – ports connected to external cables

Test type	No. of pairs simultaneously tested	Test connections	Primary protection	Port / Reference to rationale - Test No. in [ITU-T K.21]			
				Symmetric port	Co-axial port	Dedicated power feed port	Mains power port
Lightning/voltage	Single	Transverse/differential	No	Not clarified (2.1.1a)	Not clarified (3.1.1)	Not clarified (4.1.1a)	Not clarified (5.1.1a)
		Port to earth	No	Clause 6.1.1 (2.1.1b)	n/a	Clause 6.1.3 (4.1.1b)	Clause 6.1.4 (5.1.1b)
		Port to external port	No	Clause 6.1.1 (2.1.1c)	n/a	Clause 6.1.3 (4.1.1c)	Clause 6.1.4 (5.1.1c)
		Coordination /Transverse/differential	Yes	Not clarified (2.1.2a)	Not clarified (3.1.2)	Not clarified (4.1.2a)	Not clarified (5.1.2a)