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SERIES K: PROTECTION AGAINST INTERFERENCE

Safety criteria for telecommunication equipment

Recommendation ITU-T K.51

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Summary

Recommendation ITU-T K.51 provides guidance on safety criteria for telecommunication network infrastructure equipment. It specifies requirements intended to reduce risks of fire, electric shock or injury for the operator, layman and service personnel who may come into contact with the equipment. This Recommendation refers to IEC 60950-1 and provides additional requirements when these are not covered by IEC 60950-1. Equipment complying with the relevant requirements in this Recommendation is considered suitable for use in a telecommunication network. However, this Recommendation does not include requirements for performance or functional characteristics of equipment.

Source

Recommendation ITU-T K.51 was approved on 14 July 2009 by ITU-T Study Group 5 (2009-2012) under Recommendation ITU-T A.8 procedures.

Keywords

Remote power feeding, safety, telecommunication equipment.

FOREWORD

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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.

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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/.

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Introduction

This Recommendation provides guidance on safety criteria for telecommunication network infrastructure equipment. The requirements of this Recommendation have been developed in cooperation with IEC TC108. This Recommendation should be read together with [IEC 60950-1].

Recommendation ITU-T K.51

Safety criteria for telecommunication equipment

1 Scope

1.1 Equipment covered by this Recommendation

This Recommendation is applicable to mains-powered, battery-powered or remotely-powered telecommunication network infrastructure equipment.

This Recommendation specifies requirements intended to reduce risks of fire, electric shock, mechanical hazards or injury for the operator and layman who may come into contact with the equipment and, where specifically stated, for service personnel.

This Recommendation is intended to reduce such risks with respect to installed equipment, whether it consists of a system of interconnected units or independent units, subject to installing, operating and maintaining the equipment in the manner prescribed by the manufacturer.

Equipment complying with the relevant requirements in this Recommendation is considered suitable for use in a telecommunication network. However, this Recommendation does not include requirements for performance or functional characteristics of equipment.

1.2 Additional requirements

Requirements additional to those specified in this Recommendation may be necessary for:

- equipment intended for operation in special environments, for example, extremes of temperature; excessive dust, moisture or vibration; flammable gases; and corrosive or explosive atmospheres;
- equipment intended to be used in vehicles, on board ships or aircraft, in tropical countries, or at altitudes greater than 2000 m;
- equipment intended for use where ingress of water is possible.

NOTE – Attention is drawn to the fact that authorities of some countries impose additional requirements.

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.50] Recommendation ITU-T K.50 (2000), *Safe limits of operating voltages and currents for telecommunication systems powered over the network.*

[IEC 60950-1] IEC 60950-1 (2005), *Information technology equipment – Safety – Part 1: General requirements*.

[IEC 60950-21] IEC 60950-21 (2002), *Information technology equipment – Safety – Part 21: Remote power feeding*.

NOTE – This Recommendation refers to [IEC 60950-1], but the related concepts or requirements of IEC 60950 are still applicable in countries where IEC 60950 is still used.

3 Definitions

In this Recommendation, the definitions introduced by [ITU-T K.50], [IEC 60950-1] and [IEC 60950-21] are used. As it is recommended to read these documents together, the definitions are not reproduced here.

4 Abbreviations

This Recommendation uses the following abbreviations:

RFT Remote Feeding Telecommunication circuit

RFT-C Remote Feeding Telecommunication circuit-Current limited

RFT-V Remote Feeding Telecommunication circuit-Voltage limited

SELV Safety Extra Low Voltage

TNV Telecommunication Network Voltage

5 Safety criteria for telecommunication network infrastructure equipment

5.1 General requirements

Telecommunication network infrastructure equipment shall comply with all the relevant requirements of [IEC 60950-1] and [IEC 60950-21].

5.2 Special requirements

Remote feeding telecommunication circuits (RFT circuits) are defined in both [ITU-T K.50] and [IEC 60950-21]. For RFT circuits the requirements in clauses 5.2.1, 5.2.2, 5.2.3 and 5.2.6 apply.

The requirements for openings in telecommunication network infrastructure equipment are described in [IEC 60950-1]; however, the existing requirements do not restrict the entry of vermin or geckos. For enclosure openings, the requirements of clauses 5.2.5 and 5.2.6 apply.

For the reader's convenience, a cross-reference, between the requirements of this Recommendation and similar paragraphs of [IEC 60950-1] is provided in Appendix I.

5.2.1 Protection from electric shock and energy hazards

5.2.1.1 Access to energized parts

The equipment shall be so constructed that in user access areas, there is adequate protection against contact with bare parts of RFT circuits.

5.2.1.2 Protection in service access areas

Bare parts at hazardous voltages, except for RFT circuits, shall be located or guarded so that unintentional contact with such parts is unlikely during service operations involving other parts of the equipment.

Bare parts at hazardous voltage, including RFT circuits, shall be located or guarded so that accidental shorting to SELV circuits or to TNV circuits, for example by tools or test probes used by service personnel, is unlikely.

5.2.1.3 Protection in restricted access locations

For equipment to be installed in a restricted access location, contact is permitted with the bare parts of RFT circuits by the test finger as defined in Figure 2A of [IEC 60950-1]. However, such parts shall be so located or guarded that unintentional contact is unlikely.

5.2.2 Interconnection of equipment

5.2.2.1 General requirements

Where equipment is intended to be electrically connected to other equipment, interconnection circuits shall be selected to provide continued conformance to the requirements of [ITU-T K.50] for RFT circuits, after making the connections.

NOTE 1 – This is normally achieved by connecting RFT-C circuits to RFT-C circuits and RFT-V circuits to RFT-V circuits.

NOTE 2 – It is permitted for an interconnecting cable to contain more than one type of circuit (e.g., SELV, limited current, TNV, ELV, RFT, or hazardous voltage) provided that they are separated as required by this Recommendation and [IEC 60950-1].

5.2.2.2 Types of interconnecting circuits

An RFT can be an interconnection circuit.

5.2.2.3 Interconnection between RFT circuits

The interconnection of one RFT-V circuit to another RFT-V circuit shall not result in exceeding the limits specified in Annex A of [ITU-T K.50]. The interconnection of one RFT-C circuit to another RFT-C circuit shall not result in exceeding the limits specified in Annex B of [ITU-T K.50].

5.2.3 Protection of telecommunication network service personnel, and users of other equipment connected to the network, from hazards in the equipment

5.2.3.1 Protection from hazardous voltages

Circuitry intended to be directly connected to a telecommunication network shall comply with the requirements of an SELV circuit, a TNV circuit or an RFT circuit.

5.2.4 Separation from other circuits and parts

An RFT circuit shall be separated from:

- other RFT circuits by functional isolation; provided that neither circuit exceeds the limits of [ITU-T K.50] if this isolation is short-circuited. Otherwise, the circuits shall be separated as if one were at a hazardous voltage;
- ELV circuits by supplementary insulation;
- earthed accessible parts, earthed SELV circuits and earthed TNV circuits by basic insulation;
- unearthed accessible parts, unearthed SELV circuits, unearthed TNV circuits and circuits at hazardous voltages by one or both of the following:
  - double or reinforced insulation;
  - basic insulation, together with protective screening connected to the main protective earthing terminal.

Compliance is checked by inspection and measurement.

5.2.5 Preventing vermin ingress

Vermin ingress can have a number of adverse effects such as:

- Biting or stinging of service personnel;
- Causing faults in the equipment;
- Causing a fire in the equipment.

Equipment enclosure holes or openings are restricted in size, by [IEC 60950-1], to prevent hazardous contact with energized circuitry. This is verified by the use of a jointed test finger, pin and probe such as described in [IEC 60950-1], Figures 2A, 2B and 2C, respectively.

The test pin has the smallest diameter. An enclosure opening smaller than 3 mm will prevent test pin entry. Circular or mesh openings of 3 mm or less will also prevent the entry of most common stinging insects such as: honey bees, bumble bees, yellow jackets, bald-faced hornets, European hornets, and some other solitary wasp species. Only very small insects, such as 1 mm long fire ants, can still enter through a 3 mm hole and establish nests.

Ground level and subterranean enclosures are particularly vulnerable to ant infestation. Mounting the enclosure above ground, on a pole or to the side of a building reduces the risk of infestation. Enclosures designed to prevent the entry of rain and dust further reduce the risk of ant infestation.

5.2.6 Installation instructions

For equipment using an RFT circuit intended for interconnection with other equipment, the installation instructions shall specify all of the following:

– the effective capacitance of the equipment:
  - between the connection points for the conductors of the telecommunication network; and
  - between the connection point for one conductor of the telecommunication network and earth;
– that a system assessment shall be carried out to ensure that the effective capacitance of the total system, including the capacitance of the equipment, does not exceed the values specified in Figure 1;
– that the voltage rating of the telecommunication network must be adequate for the normal RFT circuit voltage, together with any superimposed transient;
– RFT circuit voltage.

For equipment with enclosure holes or openings, the installation instructions shall specify detailed installation requirements for preventing vermin or gecko entry, e.g., installation location, safeguard methods.

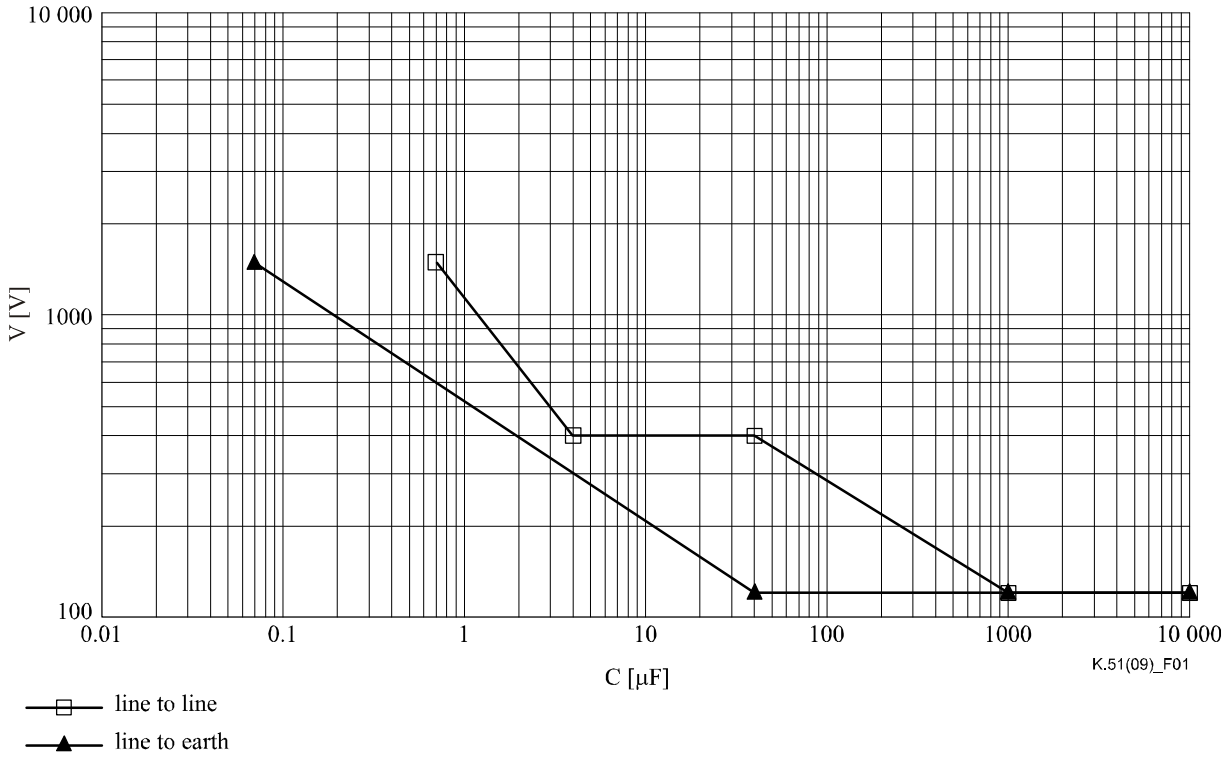

Figure 1 – Limits for capacitance values of RFT circuits or of the total system

Appendix I

Cross-reference between Recommendation ITU-T K.51 and IEC 60950-1

(This appendix does not form an integral part of this Recommendation)

For the reader's convenience, this appendix provides a cross-reference between the requirements of this Recommendation and paragraphs of [IEC 60950-1] where similar requirements for other circuits are given (Table I.1).

Table I.1

K.51 clause number	IEC 60950-1 paragraph number
5.2.1.1	2.1.1.1
5.2.1.2	2.1.2
5.2.1.3	2.1.3
5.2.2	3.5
5.2.2.1	3.5.1
5.2.2.2	3.5.2
5.2.2.3	–
5.2.3	6.1
5.2.3.1	6.1.1
5.2.4	–
5.2.5	–
5.2.6	–

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