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SERIES K: PROTECTION AGAINST INTERFERENCE

Classification of electromagnetic environmental conditions for telecommunication equipment – Basic EMC Recommendation

ITU-T Recommendation K.34

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Classification of electromagnetic environmental conditions for telecommunication equipment – Basic EMC Recommendation

Summary

This Recommendation defines electromagnetic environmental classes for telecommunication equipment covering all relevant electromagnetic environmental parameters. This Recommendation applies to telecommunication equipment installed in telecommunication centres, outdoor locations and customer premises. This is a basic EMC Recommendation for telecommunications.

Source

ITU-T Recommendation K.34 was approved by ITU-T Study Group 5 (2001-2004) under the ITU-T Recommendation A.8 procedure on 29 July 2003.

FOREWORD

The International Telecommunication Union (ITU) is the United Nations specialized agency in the field of telecommunications. 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.

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Introduction

This Recommendation is a compilation of data concerning electromagnetic environmental conditions.

The phenomena covered by this Recommendation are:

- electrostatic discharges (ESD);
- electrical fast transients/bursts (EFT/B);
- conducted radio-frequency disturbances;
- radiated radio-frequency disturbances;
- d.c. voltages;
- 16 2/3 Hz voltages;
- 50 Hz/60 Hz voltages;
- audio frequency voltages;
- surges;
- voltage variations;
- voltage fluctuations;
- voltage interruptions;
- audio frequency magnetic fields;
- lightning electromagnetic pulses;
- low frequency repetitive impulses.

The data included in this Recommendation are based on calculation, analysis and experience, supported by comprehensive environmental surveys where such surveys exist.

Certain assumptions on the installation practice are necessary when characterizing the electromagnetic environment. If these assumptions are not satisfied in a particular case, the environmental characteristic may not apply.

Each environment is characterized in two ways:

- by a short verbal description;
- by a quantitative statement of the characteristic severities of the phenomena.

The appropriate EMC requirements for telecommunication equipment should be based on the severity of the electromagnetic environment. The EMC requirements ensure that the equipment has a sufficient intrinsic immunity to enable it to operate as intended in its environment. It is emphasized that the characteristic severity of a phenomenon or parameter does not automatically indicate the test level used in immunity testing. Other considerations, e.g., priority of service of the equipment in question and technical and economic circumstances should also be taken into account when selecting the test level of those given in basic standards on test methods.

This Recommendation is a basic EMC Recommendation for telecommunications.

ITU-T Recommendation K.34

Classification of electromagnetic environmental conditions for telecommunication equipment – Basic EMC Recommendation

1 Scope

This Recommendation defines classification of the electromagnetic environmental conditions encountered where telecommunication equipment is installed.

This Recommendation applies to telecommunication equipment installed in telecommunication centres, outdoor locations and customer premises. It does not make references to equipment dependent details.

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

- [1] IEC/TR2 61000-2-5:1995, *Electromagnetic compatibility (EMC) – Part 2: Environment – Section 5: Classification of electromagnetic environments. Basic EMC publication.*
- [2] ITU-T Recommendation K.27 (1996), *Bonding configurations and earthing inside a telecommunication building.*
- [3] ITU-T Recommendation K.18 (1988), *Calculation of voltage induced into telecommunication lines from radio station broadcasts and methods of reducing interference.*
- [4] ITU-T Recommendation K.23 (1988), *Types of induced noise and description of noise voltage parameters for ISDN basic user networks.*
- [5] IEC 60050-161:1990, *International Electrotechnical Vocabulary. Chapter 161: Electromagnetic Compatibility.*
- [6] ITU-T Recommendation K.33 (1996), *Limits for people safety related to coupling into telecommunications system from a.c. electric power and a.c. electrified railway installations in fault conditions.*

3 Definitions

The following definitions apply only in the context of this Recommendation, except where the reference to the International Electrotechnical Vocabulary [5] is given adjacent to the subclause title.

3.1 burst (161-02-07): A sequence of a limited number of distinct pulses or an oscillation of limited duration.

3.2 characteristic severity: The characteristic severity for a certain detail parameter in an environmental class states a severity which has only a low probability, generally less than 1%, of being exceeded. The term relates to duration, rate of occurrence or location. It applies to

requirements on the environment and to immunity requirements. In reference [1], the term "disturbance degree" is used as the quantitative characterization of the environmental parameters.

3.3 continuous disturbance (161-02-11): Electromagnetic disturbance the effect of which on a particular device or equipment cannot be resolved into a succession of distinct effects.

3.4 environment; environmental conditions: The electromagnetic conditions external to the equipment, to which it is subjected for a certain time. The environmental conditions comprise a combination of single environmental parameters and their severities.

3.5 environmental class: A representation of the environment on locations with similar properties. They are specified and standardized to provide an operational frame of reference for:

- requirements on the environment;
- immunity requirements.

The class is described using an envelope of environmental conditions expressed in terms of a number of environmental parameters and their characteristic severities or other characteristics. The environmental parameters specified for the class are limited to those which may affect equipment performance.

3.6 environmental parameters: The environmental parameters present one or more properties of the electromagnetic environment.

3.7 immunity (to a disturbance) (161-01-20): The ability of a device, equipment or system to perform without degradation in the presence of an electromagnetic disturbance.

3.8 pulse (161-02-02): An abrupt variation of short duration of a physical quantity followed by a rapid return to the initial value.

3.9 Radio Frequencies (RF): The frequency range above 9 kHz.

3.10 rise time (of a pulse) (161-02-05): The interval of time between the instants at which the instantaneous value of a pulse first reaches a specified lower value and then a specified upper value.

NOTE – Unless otherwise specified, the lower and upper values are fixed at 10% and 90% of the pulse magnitude.

3.11 shielding effectiveness: For a given external source, the ratio (usually expressed in dB) of electric or magnetic field strength at a point before and after the placement of the shield in question.

3.12 transient (adjective or noun) (161-02-01): Pertaining to or designating a phenomenon or a quantity which varies between two consecutive steady states during a time interval short compared with the time scale of interest.

3.13 Audio Frequencies (AF): The frequency range from 50 Hz to 20 kHz.

4 Abbreviations

This Recommendation uses the following abbreviations:

a.c.	alternating current
AF	Audio Frequency
d.c.	direct current
EFT/B	Electrical Fast Transient/Burst
EMC	Electromagnetic Compatibility
ESD	Electrostatic Discharge
HV	High Voltage