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SIST EN 300 386-2:2000

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Elektromagnetna združljivost (EMC) in zadeve v zvezi z radijskim spektrom (ERM) - Oprema za telekomunikacijsko omrežje - Zahteve za elektromagnetno združljivost (EMC) - 2. del: Standard za družino izdelkov

Electromagnetic compatibility and Radio spectrum Matters (ERM); Telecommunication network equipment; ElectroMagnetic Compatibility (EMC) requirements; Part 2: Product family standard

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Foreword

This European Standard (Telecommunications series) has been produced by ETSI Technical Committee Electromagnetic compatibility and Radio spectrum Matters (ERM).

The present document is part 2 of a multi-part document covering Telecommunication network equipment ElectroMagnetic Compatibility (EMC) requirements, as identified below:

Part 1: "Product family overview, compliance criteria and test levels";

Part 2: "Product family standard".

The present EN has been produced by ETSI in response to a mandate from the European Commission issued under Council Directive 83/189/EEC (as amended) laying down a procedure for the provision of information in the field of technical standards and regulations.

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The present EN is intended to become a Harmonized Standard, the reference of which will be published in the Official Journal of the European Communities referencing the Council Directive on the approximation of the laws of the Member States relating to electromagnetic compatibility ("the EMC Directive") (89/336/EEC as amended).

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Technical specifications relevant to the EMC Directive are given in annex A.

National transposition dates	
Date of adoption of this EN:	5 December 1997
Date of latest announcement of this EN (doa):	31 March 1998
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	30 September 1998
Date of withdrawal of any conflicting National Standard (dow):	30 September 2002

1 Scope

The present document defines the product-specific performance criteria and operating conditions for equipment intended to be used within a telecommunications network (as defined in clause 3):

- **Switching equipment.** Such equipment includes:
  - local telephone exchanges;
  - remote switching concentrators;
  - international switches;
  - telex switches;
  - network packet switches.

  General purpose equipment which is used as a part of a switching system may be covered by the scope of other standards. For such equipment, if those other standards fully cover all the requirements of the present document, no further requirements are necessary. Switching equipment can also contain transmission functions, and this has to be recognized during testing.
- **Non-radio transmission equipment and ancillary equipment**. Such equipment includes:
  - multiplexers;
  - line equipment and repeaters, e.g. equipment for:
    - Synchronous Digital Hierarchy (SDH);
    - Plesiochronous Digital Hierarchy (PDH);
    - Asynchronous Transfer Mode;

    such as:
    - Digital Cross Connect systems;
    - network terminations.
- **Power supply equipment**. Such equipment includes:
  - central power plant;
  - end of suite power supplies;
  - uninterruptible power supplies;
  - stabilized ac power supplies;
  - and other dedicated telecommunication network power supplies;

  but excludes equipment which is uniquely associated with or integrated in other equipment.
- **Supervisory equipment**. Such equipment includes:
  - network management equipment;
  - operator access maintenance equipment;
  - traffic measurement systems;
  - line test units;
  - functional test units.

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The function of *supervision* may either be performed by independent equipment or form part of other telecommunication equipment. If the function of supervision forms part of a telecommunication equipment, the performance may be evaluated simultaneously with other functions (such as switching and transmission) during EMC testing.

Supervisory equipment may also be used in conjunction with radio equipment.

The environmental classification used in the present document refers to ETS 300 386-1 [1], in particular to annex B (Classification of environmental conditions).

The requirements of the present document have been selected to ensure an adequate level of immunity for the apparatus covered by the scope of this document. The levels do not, however, cover extreme cases which may occur at any location but with a low probability of occurrence. In special cases, situations may arise where the levels of disturbance may exceed the immunity test levels specified in the present document. In these instances, special mitigation measures may have to be employed.

Equipment for cabled distribution systems for television and sound signals as defined in EN 50083-2 [24], equipment for submarine cable systems as defined in ITU-T Recommendation G.971 [34] and optical amplifiers as defined in ITU-T Recommendations G.661 [27] and G.662 [28] are outside the scope of the present document.

2 References

References may be made to:

a) specific versions of publications (identified by date of publication, edition number, version number, etc.), in which case, subsequent revisions to the referenced document do not apply; or

b) all versions up to and including the identified version (identified by "up to and including" before the version identity); or

c) all versions subsequent to and including the identified version (identified by "onwards" following the version identity); or

d) publications without mention of a specific version, in which case the latest version applies.

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A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

2.1 Normative references

[1] ETS 300 386-1 (1994): "Equipment Engineering (EE); Telecommunication network equipment Electro-Magnetic Compatibility (EMC) requirements; Part 1: Product family overview, compliance criteria and test levels".

[2] ETS 300 127 (1994): "Radiated emission testing of physically large telecommunication systems".

[3] ETS 300 132-1 (1996): "Equipment Engineering (EE); Power supply interface at the input to telecommunications equipment Part 1: Operated by alternating current (ac)".

[4] ETS 300 132-2 (1996): "Equipment Engineering (EE); Power supply interface at the input to telecommunications equipment Part 2: Operated by direct current (dc)".

[5] ETR 238 (1995): "ETSI/CENELEC standardization programme for the development of Harmonized Standards related to Electro-Magnetic Compatibility (EMC) in the field of telecommunications".

[6] EN 50082-1 (1992): "Electromagnetic compatibility - Generic immunity standard. Part 1: Domestic, commercial and light industry".

[7] EN 55022 (1994): "Limits and methods of measurement of radio disturbance characteristics of information technology equipment".

[8] EN 61000-3-2 (1995): "Electromagnetic Compatibility (EMC) Part 3: Limits Section 2: Limits for harmonic current emissions (equipment input current less than or equal to 16 A per phase)".

[9] EN 61000-3-3 (1995): "Electromagnetic Compatibility (EMC) Part 3: Limits Section 3: Limitation of voltage fluctuations and flicker in low-voltage supply systems for equipment with rated current less than or equal to 16 A".

[10] EN 61000-4-2 (1995): "Electromagnetic Compatibility (EMC); Part 4: Testing and Measurement Techniques; Section 2: Electrostatic discharge immunity test Basic EMC publication"

[11] EN 61000-4-3 (1996): "Electromagnetic Compatibility (EMC); Part 4: Testing and Measurement Techniques; Section 3: Radiated, radio-frequency, electromagnetic field immunity test".

[12] EN 61000-4-4 (1995): "Electromagnetic Compatibility (EMC); Part 4: Testing and Measurement Techniques; Section 4: Electrical fast transient/burst immunity test; Basic EMC publication".

[13] EN 61000-4-5 (1995): "Electromagnetic Compatibility (EMC); Part 4: Testing and Measurement Techniques; Section 5: Surge immunity test".

[14] EN 61000-4-6 (1996): "Electromagnetic Compatibility (EMC); Part 4: Testing and Measurement Techniques; Section 6: Conducted disturbances induced by radio-frequency fields".

[15] EN 61000-4-11 (1994): "Electromagnetic Compatibility (EMC); Part 4: Testing and Measuring Techniques; Section 11: Voltage dips, short interruptions and voltage variations; Immunity tests".

[16] ITU-T Recommendation K.20 (1993): "Resistibility of telecommunication switching equipment to overvoltages and overcurrents".

[17] ITU-T Recommendation K.21 (1988): "Resistibility of subscribers' terminals to overvoltages and overcurrents".

[18] ITU-T Recommendation O.41 (1995): "Psophometer for Use on Telephone-Type Circuits".

[19] ITU-T Recommendation O.150 (1992): "Digital test patterns for performance measurements on digital transmission equipment".

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2.2 Informative references

[20] ETS 300 011 (1992): "Integrated Services Digital Network (ISDN); Primary rate user-network interface; Layer 1 specification and test principles".

[21] ETS 300 012 (1992): "Integrated Services Digital Network (ISDN); Basic user-network interface; Layer 1 specification and test principles".

[22] ETS 300 166 (1993): "Transmission and Multiplexing (TM); Physical and electrical characteristics of hierarchical digital interfaces for equipment using the 2 048 kbit/s-based plesiochronous or synchronous digital hierarchies".

[23] ETS 300 232 (1993) as amended by Amendment 1 (1996): "Transmission and Multiplexing (TM); Optical interfaces for equipments and systems relating to the Synchronous Digital Hierarchy".

[24] EN 50083-2 (1995): "Cabled distribution systems for television and sound signals; Part 2: Electromagnetic compatibility for equipment".

[25] IEC 50 chapter 714 (1990): "International Electrotechnical Vocabulary. Chapter 714: Switching and signalling in telecommunications".

[26] ISO/IEC 8802-3 (1993): "Information Technology; Local and metropolitan area networks; Part 3: Carrier sense multiple access with collision detection (CSMA/CD) access method and physical layer specifications".

[27] ITU-T Recommendation G.661 (1993): "Definition and test methods for the relevant generic parameters of optical fibre amplifiers".

[28] ITU-T Recommendation G.662 (1988): "Generic characteristics of optical fibre amplifier devices and sub-systems".

[29] ITU-T Recommendation G.712 (1992): "Transmission performance characteristics of pulse code modulation".

[30] ITU-T Recommendation G.812 (1988): "Timing requirements at the outputs of slave clocks suitable for plesiochronous operation of international digital links".

[31] ITU-T Recommendation G.813 (1996): "Timing characteristics of SDH equipment slave clocks".

[32] ITU-T Recommendation G.958 (1994): "Digital line systems based on the synchronous digital hierarchy for use on optical fibre cables".

[33] ITU-T Recommendation G.961 (1993): "Digital transmission system on metallic local lines for ISDN Basic Rate Access".

[34] ITU-T Recommendation G.971 (1993): "General features of optical fibre submarine cable systems".

[35] ITU-T Recommendation Q.552 (1994): "Transmission characteristics at 2-wire analogue interfaces of digital exchanges".

[36] ITU-T Recommendation V.10 (1994): "Electrical characteristics for unbalanced double-current interchange circuits operating at data signalling rates up to 100 kbit/s".

[37] ITU-T Recommendation V.11 (1994): "Electrical characteristics for balanced double-current interchange circuits operating at data signalling rates up to 10 Mbit/s".

[38] ITU-T Recommendation V.24 (1994): "List of definitions for interchange circuits between data terminal equipment (DTE) and data circuit-terminating equipment (DCE)".

[39] ITU-T Recommendation V.28 (1994): "Electrical characteristics for unbalanced double-current interchange circuits".

[40] ITU-T Recommendation V.35 (1984): "Data transmission at 48 kilobits per second using 60-108 kHz group band circuits".

[41] ITU-T Recommendation V.36 (1988): "Modems for synchronous data transmission using 60 - 108 kHz group band circuits".

[42] ITU-T Recommendation X.24 (1988): "List of definitions for interchange circuits between Data Terminal Equipment (DTE) and Data Circuit-terminating Equipment (DCE) on public data networks".

[43] ITU-T Recommendation X.25 (1993): "Interface between data terminal equipment (DTE) and data circuit-terminating equipment (DCE) for terminals operating in the packet mode and connected to public data networks by dedicated circuit".

[44] 89/336/EEC: "Council Directive of 3 May 1989 on the approximation of laws of the Member States relating to Electromagnetic Compatibility" (Official Journal L139 of 23/5/89) as modified by 92/31/EEC.

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3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the definitions of ETS 300 386-1 [1] subclause 3.1 and the following definitions apply:

ac secondary interface: The output port of a ac power supply.

ac secondary voltage: The output of the ac power supply at the ac secondary interface.

NOTE 1: The ac secondary voltage may be either:

- a stabilized ac supply derived from a dc primary supply (e.g. where the power supply is an inverter); or
- derived from the ac primary supply (e.g. a stabilized power supply used where the quality of the primary supply is not sufficient to feed telecommunication equipment.

connection: A temporary association of transmission channels or telecommunication circuits, switching or other functional units set up to provide for the transfer of information between two or more points in a telecommunication network (IEC 50 [25], chapter 714-01-09).

dc secondary interface: The output port of a dc power supply.

dc secondary voltage: The output of the dc power supply at the dc secondary interface. The dc secondary voltage may be derived from the ac primary supply with or without a buffer battery.

enclosure port: The physical boundary of the Equipment Under Test (EUT) through which electromagnetic fields may emanate or on which they may impinge.

interface "A": The terminals at which a power supply is connected to the telecommunications equipment.

nominal voltage: The nominal value of voltage that designates the type of supply.

normal service: The service mode where telecommunications equipment operates within its specification.

performance criterion: The limits of acceptable behaviour of the equipment during and after the application of the electromagnetic phenomenon.

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NOTE 2: Performance criteria A apply for continuous phenomena; performance criteria B and C apply for transient phenomena; and performance criteria R apply for resistibility phenomena.

port: A particular interface of the EUT with the external electromagnetic environment.

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power supply: A power source (within the scope of the present document) to which telecommunications equipment is intended to be connected.

primary supply: The public mains or a locally generated ac or dc supply.

resistibility: The ability of telecommunication equipment or a network to withstand the effects of certain electrical, magnetic and electromagnetic phenomena up to a certain, specified extent, and in accordance with a specified criterion, e.g., the ability of a telecommunication device to withstand a surge voltage of 2 kV on its 230 V power port without being damaged.

secondary supply: The supply to the telecommunications equipment (e.g. racks or system blocks), derived from the primary supply.

system block: A functional group of equipment depending for its operation and performance upon the secondary power supply.

telecommunication network: A network operated under a licence granted by a national telecommunications authority which provides telecommunications between network termination points (NTPs) (i.e. excluding terminal equipment beyond the NTPs).

tertiary supply: A supply to the telecommunications equipment derived from the secondary supply.

3.2 Abbreviations

For the purposes of the present document, the abbreviations of ETS 300 386-1 [1] subclause 3.2 and the following abbreviations apply:

AM	Amplitude Modulation.
AV	Average

EUT	Equipment Under Test
N/A	Not Applicable
NTP	Network Termination Point
PDH	Plesiochronous Digital Hierarchy
PRBS	Pseudo Random Bit Sequence
QP	Quasi-Peak
rms	root-mean-square
T_r/T_h	Rise time (10 % to 90 %) and hold time (50 % to 50 %) of transient signal (see EN 61000-4-4 [12])
U_{pso}	Voltage measured with a psophometer conforming to Recommendation O.41 [18]

4 Installation environment

The installation environment for the Equipment Under Test (EUT) will normally be "telecommunication centre". Locations "other than telecommunication centre" apply where the EUT is to be operated specifically not within a telecommunication centre, e.g. within offices, customers' premises, streets, etc.

If no restrictions are specified in the product documentation for the installation environment, the product shall comply with the requirements of both environments, implying that the more severe test level shall be used when the test is performed. Equipment which meets the (more severe) requirements for "other than telecommunications centres" may be operated in either location.

5 Test methods and limits

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The emission, immunity and resistibility requirements in the following tables are derived from the requirements for normal priority of service as defined in ETS 300 386-1 [1] using, for immunity, the lowest test levels. Emission, immunity and resistibility shall all be tested.

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For additional information on general requirements for test methods and limits, see clauses 6 and 7 of ETS 300 386-1 [1]. The test levels are compiled in the following tables.

For power supply equipment, the following conducted immunity tests do not apply to the output power port (secondary interface) of the EUT:

- voltage dips;
- short interruptions and voltage variations.