



SLOVENSKI STANDARD

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Environmental Engineering (EE); Power supply interface at the input to telecommunications equipment; Part 3: Operated by rectified current source, alternating current source or direct current source up to 400 V

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European Standard (Telecommunications series)

**Environmental Engineering (EE);
Power supply interface at the input to
telecommunications equipment;
Part 3: Operated by rectified current source,
alternating current source or
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ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
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Foreword

This European Standard (Telecommunications series) has been produced by ETSI Technical Committee Environmental Engineering (EE).

The present document concerns the requirements for the interface between telecommunications equipment and its power supply and includes requirements relating to its stability and measurement. Various other references and detailed measurement and test arrangements are contained in informative annexes.

The present document is part 3 of a multi-part deliverable covering Environmental Engineering (EE); Power supply interface at the input to telecommunications equipment, as identified below:

Part 1: "Operated by alternating current (ac) derived from direct current (dc) sources";

Part 2: "Operated by direct current (dc)";

Part 3: "Operated by rectified current source, alternating current source or direct current source up to 400 V".

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1 Scope

The present document contains requirements for:

- the output performance of the power equipment at the interface A3;
- the input of the telecommunications equipment connected to interface A3.

The voltage at interface A3 may be the ac mains, a rectified voltage derived from ac three phase mains, a rectified voltage derived from ac single phase mains or a low voltage derived from a battery. The power supply equipment may incorporate a backup battery.

The present document aims at providing compatibility between the power supply equipment and both the telecommunications equipment, and the different load units connected to the same interface A3 (e.g. datacom equipment).

The requirements at interface A3 apply to:

- the output of the power supply equipment or power supply installation of telecommunications centres;
- the power supply input of telecommunications equipment and the datacom equipment installed at telecommunications centres;
- telecommunications equipment and the datacom equipment, installed in customer's premises, whose power interface A3 is also used by equipment requiring a supply to the present document.

The purpose of the present document is:

- to identify a power supply system with the same characteristics for all telecommunications and data communication equipment defined in the area of application;
- to facilitate interworking of different (types of) loads units;
- to facilitate the standardization of power supply systems for telecommunications and datacom equipment;
- to facilitate the installation, operation and maintenance in the same network of equipment and telecommunications and datacom systems from different origins.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication and/or edition number or version number) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.

Referenced documents which are not found to be publicly available in the expected location might be found at <http://docbox.etsi.org/Reference>.

- | | |
|-----|---|
| [1] | IEC 60364-4-44: "Electrical installations of buildings - Part 4-44: Protection for safety - Protection against voltage disturbances and electromagnetic disturbances". |
| [2] | IEC 60364-5-54: "Electrical installations of buildings - Part 5-54: Selection and erection of electrical equipment - Earthing arrangements, protective conductors and protective bonding conductors". |
| [3] | CENELEC HD 472 S1: "Nominal voltage for low-voltage public electricity supply systems". |

- [4] CISPR 16-1: "Specification for radio disturbance and immunity measuring apparatus and methods Part 1: Radio disturbance and immunity measuring apparatus".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

abnormal voltage range: range of steady-state voltages over which the equipment will not be expected to maintain normal service but will survive undamaged

customer premises: any location which is the sole responsibility of the customer

datacom equipment: information technology equipment

interface A3: interface, physical point, at which power supply is connected to the telecommunications and datacom equipment

load unit: power consuming equipment, that is part of a system block

nominal load conditions: set of values dedicated to a test performance

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

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

normal service voltage range: range of the steady-state voltage over which the equipment will maintain normal service

power supply: power supply to which telecommunications equipment is intended to be connected

system block: functional group of equipment depending for its operation and performance on its connection to the same power supply

telecommunication centre: any location where telecommunications equipment is installed and is the sole responsibility of the operator

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

ac	alternating current (also when used as a suffix to units of measurement)
AMN	Artificial Mains Network
dc	direct current (also when used as a suffix to units of measurement)
EUT	Equipment Under Test
EMC	Electric Magnetic Compatibility
Im	maximum current
It	Instantaneous surge current
LISN	Line Impedance Stabilization Network
PE	Protective Earth
R	Resistance of resistive element of LISN
rms	root mean square (also when used as a suffix to units of measurement)
UPS	Uninterrupted Power Supply

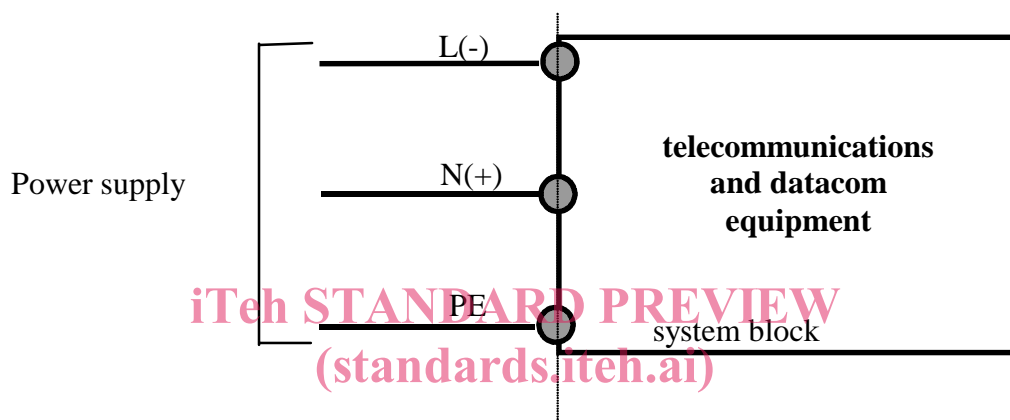
4 Interface A3

The power supply interface, interface A3 of figure 1, is a physical point to which all the requirements are related.

This point is situated between the power supply system(s) and the power consuming telecommunications equipment.

NOTE 1: Interface A3 is located at the power terminals of the telecommunications equipment. Subject to the installation preconditions, this point may be located at any other point between the power supply system and the telecommunications equipment by mutual agreement of the relevant parties.

NOTE 2: In the case where the same type of equipment is used for mains 230 V ac and dc for the following document, normal fuses (e.g. 5x20) may be unsuitable for dc (> 200 V).
If the appropriate fusing is located outside of the equipment the internal fuse should be bridged.
It is intended to use a different plug or appliance inlet to the equipment for power supply to the following document that is safe for disconnecting under load conditions.
In addition the equipment shall be labelled.



L (-) = phase or negative pole
N (+) = ac neutral or dc return conductor (see clause 6)
PE = Protective earth.

Figure 1: General identification of the interface A3

5 Requirements

The requirement of the alternating voltage for the public mains is defined in HD 472 S1 [3].

5.1 Nominal voltage

The telecommunication equipment connected to interface A3 shall be designed to operate with the following nominal voltage:

- 230 Vrms.

See clause A.1 for discussion on possible power supply.

5.2 Normal service voltages at interface A3

The normal service voltage range is as follows:

- maximum peak voltage: 375 V;
- minimum rms voltage: 188 V.

NOTE: The normal service range covers both cases of power supply derived from a single phase ac or three phase ac.

5.3 Nominal frequencies

The nominal frequency for interface A3 is defined as follows:

- if directly ac powered the frequency is 50 Hz;
- if a ripple is superimposed to the dc voltage, the frequency of the ripple is 300 Hz (rectified three phase) or 100 Hz (rectified single phase).

5.4 Abnormal service voltage ranges at interface A3

5.4.1 Abnormal service voltage under steady-state conditions

The telecommunications equipment shall be subjected to following fluctuations:

- $0\text{ V} < U < 188\text{ V}_{\text{rms}}$.

Following the restoration of the supply to the normal service voltage range, the equipment shall fulfil the following performance criteria:

- the equipment shall not suffer any damage when subjected to fluctuations mentioned above;
- the equipment shall then resume operation according to its specifications;
- the abnormal service voltage shall not lead to the disconnection of power supply units e.g. by causing circuit breakers, fuses or other such devices to operate.

5.4.2 Voltage dips, short interruptions and transients

Ac voltage dips, short interruptions and transient on ac line are covered by EMC standardization. The interface A3 shall be considered from EMC test like an ac main port.

Telecom and datacom equipment shall be in compliance with the relevant applicable EMC standards.

The power supply shall be designed in a way that any voltage interruption at interface A3 is shorter than 20 ms.

NOTE: An interruption of the voltage at interface A3 may be caused by the power supply equipment when switching in backup mode.

Performance criteria:

- the equipment in maximum configuration shall continue to function correctly when the duration of the interruption is within the above range.

5.5 Supply protection

The supply at interface A3 shall be protected, (when operating on ac, rectified ac, or dc current), by fuses or circuits breakers.

The energy content of the inrush current shall also be taken into account when specifying the power supply system up to interface A3.

5.6 Maximum current drain

The maximum current drain at any voltage in the normal and abnormal voltage range at interface A3 lasting for longer than 1 second shall not exceed 1,5 times the current drain at nominal voltage according to clause 5.1.

NOTE 1: The current should not exceed this level at any time.

NOTE 2: For shorter times see Inrush current graph (see figure 2).

5.7 Surge current on connection to interface A3

5.7.1 Limits

The ratio of the instantaneous surge current I_t to maximum current I_m at interface A3, under any random sequence of switching operations, shall not exceed the limits shown in figure 2.

The parameters are defined as follows:

- I_t : inrush current (magnitude of instantaneous values);
- I_m : maximum input current, stated by the manufacturer, for a fully-equipped and loaded system block behind interface A3.

NOTE 1: It is common practice to use fuses or breakers with a nominal trip value which is $> 1,66$ times I_m at nominal voltage.

NOTE 2: I_m is a peak value measured during steady state in normal operating mode (ac mains).
The inrush current shall be measured when powered by the nominal rms ac voltage of the mains.