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Environmental Engineering (EE) - Power supply interface at the input to telecommunications equipment - Part 2: Operated by direct current (dc)

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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 2 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".

National transposition dates	
Date of latest announcement of this EN (doa):	31 January 2008
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	31 July 2008
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1 Scope

The present document contains requirements for:

- the output performance of the direct current (DC) power equipment at the interface "A";
- the input of the telecommunications equipment connected to interface "A" powered by DC.

The DC voltage at interface "A" may be derived from the AC primary supply. The DC supply may incorporate a backup battery.

If any other equipment e.g. datacom equipment, are connected to interface "A" in parallel to telecommunications equipment, all requirements addressed in clause 4 of the present document must be fulfilled.

The present document aims at providing compatibility between the power supply equipment and the power consuming telecommunications equipment, and also between different system blocks connected to the same power supply.

NOTE 1: The present document is applicable only to -48 V_{DC} power supply interfaces. However, during a transitional period, other DC voltages may be used in existing installations. Annex A gives guidance on working in conjunction with existing -60 V_{DC} supply systems.

The power supply interface, interface "A", is a physical point to which all the requirements are related (see figure 1).

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

NOTE 2: Interface "A" 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.

The requirements at interface "A" apply to:

- the output of the power supply equipment or power supply installation of telecommunications centres;
- the power supply input of telecommunications equipment installed at telecommunication centres;
- telecommunications equipment, installed in customers' premises, whose DC interface "A" is also used by equipment requiring a supply to this specification.

NOTE 3: Normally there is more than one load unit connected to interface "A". In these cases, interface "A" will undergo further restrictions with respect to noise limits or other disturbances specified in clause 4.8.

NOTE 4: Disturbances on the power supply interface "A" relating to the continuous wave phenomena below 20 kHz are covered within the present document.

NOTE 5: An example of a configuration in which interface "A" is identified is given in annex D.

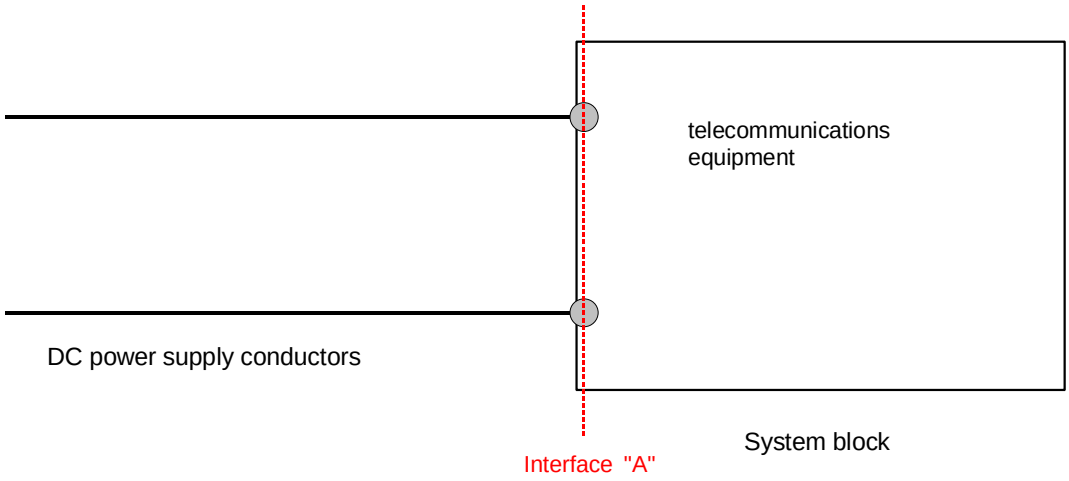

Figure 1: Identification of interface "A"

The purpose of the present document is:

- to use a power supply system with the same characteristics for all telecommunications equipment defined in the area of application;
- to facilitate inter working of different (types of) load units;
- to facilitate the standardization of telecommunications equipment;
- to facilitate the installation, operation and maintenance in the same network of equipment and telecommunications 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.

NOTE: While any hyperlinks included in this clause were valid at the time of publication ETSI cannot guarantee their long term validity.

[1] IEC 60269-1: "Low-voltage fuses - Part 1: General requirements".

[2] CENELEC EN 60934: "Circuit-breakers for equipment (CBE)".

[3] ETSI EN 300 253: "Environmental Engineering (EE); Earthing and bonding of telecommunication equipment in telecommunication centres".

[4] ITU-T Recommendation Q.551: "Transmission characteristics of digital exchanges".

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

[6] ITU-T Recommendation Q.553: "Transmission characteristics at 4-wire analogue interfaces of digital exchanges".

[7] ITU-T Recommendation Q.554: "Transmission characteristics at digital interfaces of digital exchanges".

[8] ITU-T Recommendation O.41: "Psophometer for use on telephone-type circuits".

[9] CENELEC EN 61000-4-5: "Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test".

3 Definitions, symbols 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 voltage 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

fully equipped equipment: generally there are several maximum configurations because different boards can be used in the same slots

NOTE: The fully-equipped equipment configuration shall be the configuration that corresponds to the maximum power consumption measured at -48 V_{DC} e.g. not in standby mode.

interface "A": terminals at which the power supply is connected to the system block

NOTE 1: See also figure 1.

NOTE 2: This is a functional definition and not an exact depiction of the physical location.

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

maximum continuous input current: maximum continuous input current, stated by the manufacturer, for a fully-equipped equipment under test connected to interface "A", at nominal voltage (accordance clauses 4.6 and 4.7.1 of the present document)

nominal voltage: 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 steady-state voltages over which the equipment will maintain normal service

power supply: power source 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

NOTE: A system block may consist of equipment or a functional group of equipment. Different examples of configurations at interface "A" are given in annex D.

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

3.2 Symbols

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

I_t	instantaneous surge current (see clause 4.7.1)
I_m	maximum continuous input current
L	inductance of inductive element of LISN
R	resistance of resistive element of LISN
t	time
Z_c	capacitive impedance of immunity measurement circuit
Z_m	resistive impedance of immunity measurement circuit

3.3 Abbreviations

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

CDN	Coupling/Decoupling Network
DC	direct current

NOTE: Also when used as a suffix to units of measurement.

EMC	ElectroMagnetic Compatibility
EUT	Equipment Under Test
LISN	Line Impedance Stabilization Network
RF	Radio Frequency
rms	root mean square

NOTE: Also when used as a suffix to units of measurement.

4 Requirements

4.1 Nominal voltage

The nominal value of the voltage at interface "A" shall be -48 V_{DC} (positive conductor is connected to earth).

NOTE 1: In most cases the voltage of interface "A" will be complemented by a 24 cell lead-acid battery.

NOTE 2: During a transitional period, other DC voltages may be used in existing installations. Annex A gives guidance on merging equipment with existing -60 V_{DC} supply systems.

4.2 Normal service voltage range at interface "A"

The normal service voltage range for the -48 V_{DC} nominal supply at interface "A" shall be -40,5 V_{DC} to -57,0 V_{DC}.

NOTE 1: The minimum voltage is based on the voltage drop in the distribution network and a battery cell end of discharge voltage.

NOTE 2: The voltages specified are measured at interface "A". It should be noted that if interface "A" is at any point other than the telecommunications equipment interface there will be a voltage drop between interface "A" and the equipment terminals.

NOTE 3: When the voltage is in the range -40,5 V_{DC} to -44,0 V_{DC} it is recognized that there may be a slight degradation of service performance.

4.3 Abnormal service voltage range at interface "A"

4.3.1 Abnormal service voltage under steady-state conditions

Telecommunications equipment operated at -48 V_{DC} shall not suffer any damage when subjected to the following voltage ranges:

0,0 V_{DC}	to	-40,5 V_{DC} and
-57,0 V_{DC}	to	-60,0 V_{DC}

4.3.2 Recovery from steady state abnormal voltage

Following the restoration of the supply to the normal voltage range, the power conversion and management systems on the load side of interface "A" shall automatically restore service. The telecommunications equipment shall then resume operation according to its specifications. The abnormal service voltage shall not lead to the disconnection of the power supply e.g. by causing circuit breakers, fuses or other such devices to operate.

NOTE: It is acceptable that the system may restart when the voltage is -40,5 V or greater within the nominal service voltage range and/or after a time delay.

4.3.3 Voltage transients

Voltage transients may occur at interface "A" when faults occur in the power distribution system. These transients are characterized by a voltage drop in the range: 0 VDC to 40,5 VDC, followed by an overvoltage often in excess of the maximum steady state abnormal service voltage range and dependent upon the power distribution up to interface "A" and the equipment connected to interface "A".

The performance of telecommunication equipment against this abnormal overvoltage shall be verified using the combination wave generator defined in the basic standard EN 61000-4-5 [9]. This generator has the pulse shape of 1,2 µs-rise time/50 µs-duration in open circuit and 8µs-rise time/20µs-duration in short circuit. The voltage transient wave generator test circuit is shown in figure 2.

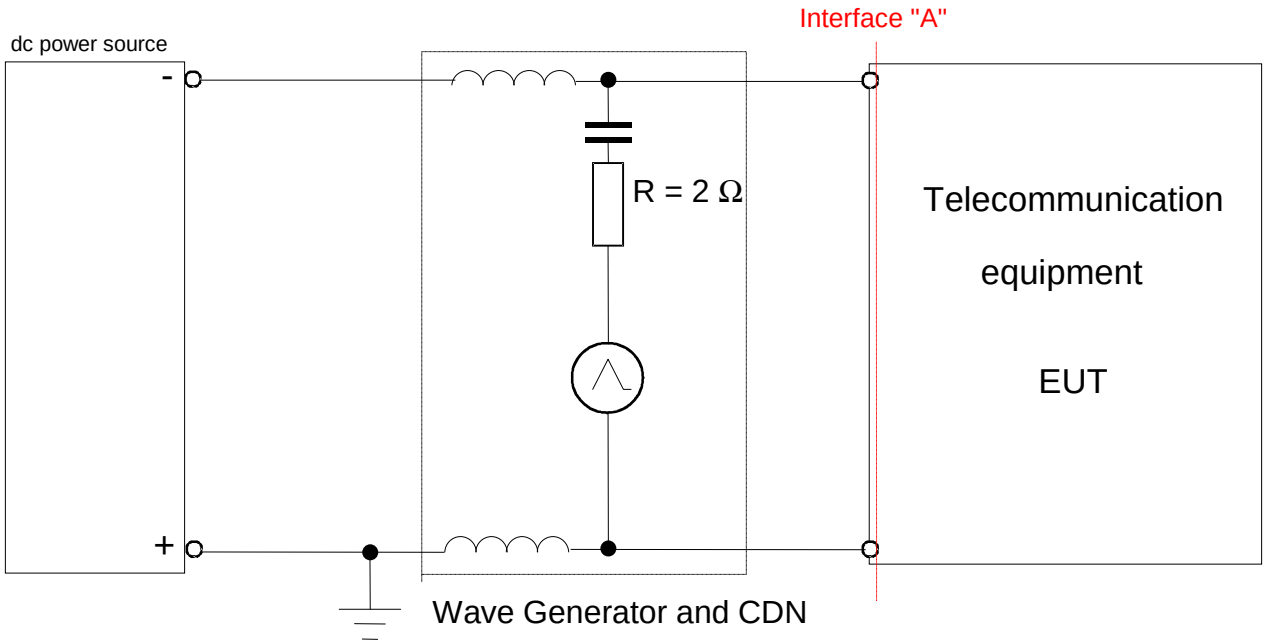

Figure 2: Voltage transient generator wave test circuit