ETSI EN 300 132-2 V2.5.1 (2016-10)

Environmental Engineering (EE);
Power supply interface at the input to telecommunications and datacom (ICT) equipment;
Part 2: Operated by -48 V direct current (dc)

Reference

REN/EE-0252

Keywords

interface, power supply

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
Sous-Préfecture de Grasse (06) N° 7803/88

Important notice

The present document can be downloaded from:
http://www.etsi.org/standards-search

The present document may be made available in electronic versions and/or in print. The content of any electronic and/or print versions of the present document shall not be modified without the prior written authorization of ETSI. In case of any existing or perceived difference in contents between such versions and/or in print, the only prevailing document is the print of the Portable Document Format (PDF) version kept on a specific network drive within ETSI Secretariat.

Users of the present document should be aware that the document may be subject to revision or change of status. Information on the current status of this and other ETSI documents is available at
https://portal.etsi.org/TB/ETSIDeliverableStatus.aspx

If you find errors in the present document, please send your comment to one of the following services:
https://portal.etsi.org/People/CommiteeSupportStaff.aspx

Copyright Notification

Contents

Intellectual Property Rights

IPRs essential or potentially essential to the present document may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: *"Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards"*, which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (https://ipr.etsi.org/).

Pursuant to the ETSI IPR Policy, no investigation, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

Foreword

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

The present document concerns the requirements for the interface between telecommunications and datacom (ICT) 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 and datacom (ICT) equipment, as identified below:

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

Part 2: "Operated by -48 V 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 adoption of this EN:	5 October 2016
Date of latest announcement of this EN (doa):	31 January 2017
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	31 July 2017
Date of withdrawal of any conflicting National Standard (dow):	31 July 2017

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the ETSI Drafting Rules (Verbal forms for the expression of provisions).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

1 Scope

The present document contains requirements and measurements methods for the physical interface that is situated between the power supply system(s) and the power consuming telecommunications and datacom (ICT) equipment; this point is called interface "A" as defined in clause 4.

The purpose of the present document is to use a power supply system with the same characteristics for all telecommunications and datacom (ICT) equipment defined in the area of application:

- to facilitate inter working of different (types of) load units;
- to facilitate the standardization of telecommunications and datacom (ICT) equipment;
- to facilitate the installation, operation and maintenance in the same network of telecommunications and datacom (ICT) equipment and systems from different origins.

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

The requirements are defined for:

- the output of the power supply equipment or power supply installation of telecommunications centres providing power at the interface "A";
- the power supply input of any type of telecommunications and datacom (ICT) equipment installed at telecommunication centres that are connected to interface "A" powered by DC;
- any type of telecommunications and datacom (ICT) equipment, installed in access networks and customers' premises, the DC interface "A" of which is also used by equipment requiring a supply to the present document.
- any type of telecommunication and datacom (ICT) equipment powered by DC, used in the fixed and mobile networks installed in different locations as building, shelter, street cabinet.

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

The present document does not cover safety requirements, they are covered by relevant safety standards.

The present document does not cover EMC requirements, they are covered by relevant EMC standards.

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 B gives guidance on working in conjunction with existing -60 V_{DC} supply systems.

NOTE 2: The DC voltage at interface "A" may be derived from the AC primary supply. The DC supply may incorporate a backup battery

2 References

2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at https://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.

The following referenced documents are necessary for the application of the present document.

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

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

[3] Void.

[4] Void.

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

[6] Void.

[7] CENELEC EN 61000-4-29: "Electromagnetic compatibility (EMC) -Part 4-29: Testing and measurement techniques -Voltage dips, short interruptions and voltage variations on d.c. input power port immunity tests".

2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

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

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

[i.1] Recommendation ITU-T Q.551: "Transmission characteristics of digital exchanges".

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

[i.3] Recommendation ITU-T Q.553: "Transmission characteristics at 4-wire analogue interfaces of digital exchanges".

[i.4] Recommendation ITU-T Q.554: "Transmission characteristics at digital interfaces of digital exchanges".

[i.5] ETSI TR 100 283: "Environmental Engineering (EE); Transient voltages at Interface "A" on telecommunications direct current (dc) power distributions".

[i.6] US Department of Defence MIL-STD-461E: "Requirements for the control of electromagnetic interference characteristics of subsystems and equipment".

[i.7] ETSI EN 300 253: "Environmental Engineering (EE); Earthing and bonding of ICT equipment powered by -48 VDC in telecom and data centres".

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

[i.9] IEC 60050-601: "International Electrotechnical Vocabulary. Chapter 601: Generation, transmission and distribution of electricity - General" (Area 826 "Electrical installations", section 826-11 "Voltages and currents").

3 Definitions, symbols and abbreviations

3.1 Definitions

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

abnormal service 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: configuration that corresponds to the maximum power consumption measured at -48 V_{DC} with the equipment in operating conditions (e.g. not in standby mode)

NOTE: When there are several fully equipped configurations because of different combinations of possible boards, the configuration with the boards that gives the highest power consumption should be considered.

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

NOTE 1: See also figure 1 and annex A.

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

malfunction: termination of the normal service

maximum steady state input current (I_m): maximum steady state input current, stated by the manufacturer, for a fully equipped equipment under test connected to interface "A" at nominal voltage

nominal voltage: value of the voltage by which the electrical installation or part of the electrical installation is designated and identified [i.9]

normal operating voltage range: voltage range at interface "A" where the system operates most of the time, e.g. in general linked to battery floating voltage

normal service: service mode where telecommunications and datacom (ICT) equipment operates within its specification which includes a defined restart time after malfunction or full interruption

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

operating voltage: value of the voltage under normal conditions, at a given instant and a given point of the system [i.9]

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 A.

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

telecommunications and datacom equipment: Information and Communication Technology (ICT) equipment

3.2 Symbols

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

I_t	instantaneous inrush current
I_m	maximum steady state 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
µs	microsecond

3.3 Abbreviations

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

AC	Alternating Current
DC	Direct Current

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

EMC	ElectroMagnetic Compatibility
ESR	Equivalent Series Resistance
EUT	Equipment Under Test
HOD	High-Ohmic Distributions
ICT	Information and Communication Technology
LISN	Line Impedance Stabilization Network
LOD	Low-Ohmic Distributions
RF	Radio Frequency
rms	root mean square
TR	Technical Report
V_{DC}	Voltage Direct Current

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

4 Requirements

4.0 Interface "A"

The power supply interface, interface "A" 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 and datacom (ICT) equipment.

An example of a configuration in which interface "A" is identified is given in annex A.

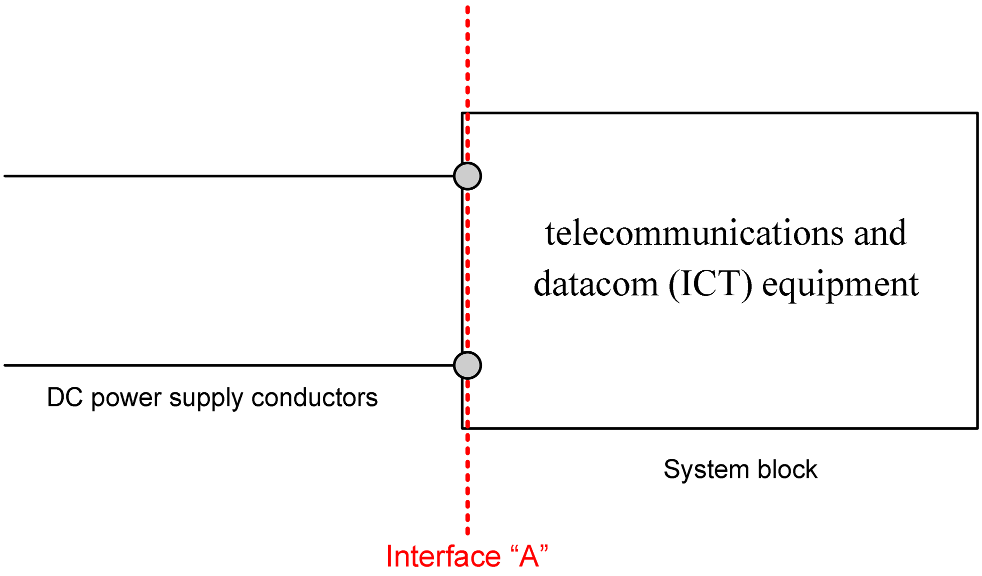

Figure 1: Identification of interface "A"

4.1 Nominal voltage

The interface and equipment shall be designated and identified by a nominal voltage.

The nominal voltage at interface "A" shall be -48 V_{DC} (positive conductor is connected to earth as defined in ETSI EN 300 253 [i.7]).

NOTE: In most cases the nominal voltage of interface "A" is based on a 24 cell lead-acid battery.

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}.

There shall be no degradation of service performance when telecommunication and datacom (ICT) equipment is operating at voltages within the normal service voltage range.

This requirement shall be verified by applying the following tests at interface "A". The testing and measurement techniques are described in CENELEC EN 61000-4-29 [7].

Table 1

Test level of Normal service voltage variation	Duration	Basic standard	Rise and fall time of voltage change	Performance criteria
From -40,5 V to -57,0 V	0,1 s	CENELEC EN 61000-4-29 [7]	Between 1 µs and 50 µs on 100 Ω resistive load (see basic standard for test generator)	No degradation in the service performance during and after the test
From -57,0 V to -40,5 V	0,1 s			

In the case of telecommunication and datacom (ICT) equipment with power supply input redundancies (e.g. power supply 1"PS1" and power supply 2 "PS2"), this test shall be performed at each power supply input at a time with and without the second power supply.

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: The operator can ask the manufacturer of telecommunications and datacom (ICT) equipment for any test made at nominal voltage -48 V to be repeated at the most common operating voltage within the normal operating voltage range e.g. -54,5 V for power consumption test.

4.3 Abnormal service voltage range at interface "A"

4.3.1 Abnormal service voltage range under steady state conditions

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

Table 2

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

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 normal service. The telecommunications and datacom (ICT) 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.

4.3.2 Abnormal conditions: voltage variations, dips and short interruptions

Telecommunication equipment shall not suffer any damage when subject to the following abnormal voltage range that can be present at the interface "A".

Table 3

Voltage variation	Duration	Basic standard	Rise and fall time of voltage change	Performance criteria
From -40,5 V to -60,0 V and from -60 V to -40,5 V	0,1 s	CENELEC EN 61000-4-29 [7]	Between 1 µs and 50 µs on 100 Ω resistive load (see basic standard)	Self restart to a normal service of the equipment without operator intervention after the test
From -57,0 V to 0,0 V and from 0,0 V to -57,0 V	0,1 s			

In the case of telecommunication and datacom (ICT) equipment with power supply input redundancies (e.g. power supply (A) and power supply B), this test shall be performed at each power supply input at a time with and without the second power supply.

4.3.3 Voltage transients

4.3.3.1 Voltage transient due to short-circuit and protective device clearance

Voltage transients may occur at interface "A" when faults (e.g. short circuits) occur in the power distribution system. These transients are characterized by a voltage drop in the range: 0 V_{DC} to -40,5 V_{DC}, 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".

NOTE 1: ETSI TR 100 283 [i.5] provides guidance for the protection of telecommunications equipment from the transients.