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Environmental Engineering (EE);
Power supply interface at the input to telecommunications and datacom (ICT) equipment;
Part 3: Operated by rectified current source, alternating current source or direct current source up to 400 V;
Sub-part 0: Overview

Reference
REN/EE-02017-0

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Foreword

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

The present document is part 3 sub-part 0 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 3-0: "Operated by rectified current source, alternating current source or direct current source up to 400 V, Sub-part 0: Overview";

Part 3-1: "Operated by rectified current source, alternating current source or direct current source up to 400 V; Sub-part 1: Direct current source up to 400 V";

Part 3-2: "Operated by rectified current source, alternating current source or direct current source up to 400 V; Sub-part 2: Alternating up to 400 V solution";

Part 3-3: "Operated by rectified current source, alternating current source or direct current source up to 400 V; Sub-part 3: Rectified current up to 400 V solution".

The parts 3-0 to 3-3 are the result of a revision of EN 300 132-3 [3]. This revision was necessary, because the present document was not clear. Sub-parts have been introduced for voltage interfaces A3 up to 400 V.

NOTE 1: For parts 1 and 2, the nominal DC voltage is -48 or -60 V.

NOTE 2: Not all the sub-parts or part 3 will be released at the same time. The first sub-parts that will be released are part 3-0 and 3-1.

National transposition dates	
Date of adoption of this EN:	9 February 2012
Date of latest announcement of this EN (doa):	31 May 2012
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	30 November 2012
Date of withdrawal of any conflicting National Standard (dow):	30 November 2012

1 Scope

The present document introduces a series of standards sub-parts specifying Power Supply Interface A3 at the input to telecommunications and datacom (ICT) equipment:

Part 3-1: "Operated by rectified current source, alternating current source or direct current source up to 400 V; Sub-part 1: Direct Current source up to 400V";

Part 3-2: "Operated by rectified current source, alternating current source or direct current source up to 400 V; Sub-part 2: Alternating up to 400 V solution".

Part 3-3: "Operated by rectified current source, alternating current source or direct current source up to 400 V; Sub-part 3: Rectified current up to 400 V solution".

The power can be supplied at the interface by a single source or a multi-source system that may include batteries or back-up generators or renewable energy sources.

The sub-part document aims at providing compatibility between the power supply equipment and both the telecom/datacom (ICT) equipment. The same interface A3 can be used for other load units connected (e.g. control/monitoring, cooling system, etc.).

The requirements at interface A3 defined in the sub-parts 1 to 3 apply to:

- the output of the power supply equipment or power supply installation for powering telecommunications and datacom (ICT) equipment;
- the power supply input of telecommunications and datacom (ICT) equipment;
- other equipment power supply input compatible with this interface.

The purpose of the present document is:

- to identify a power supply system with the same characteristics for all telecommunications and datacom (ICT) equipment defined in the area of application. The area of application may be telecom center or datacenter or customer premises (e.g. business buildings);
- to facilitate the standardization of power supply systems for telecommunications and datacom (ICT) equipment;
- to facilitate the installation, operation and maintenance in the same network of equipment and telecommunications and datacom (ICT) equipment or system from different origins;
- to facilitate interworking of different types of loads.

General requirements for safety and EMC are out of the scope of the present document series unless specific requirements are not defined in existing safety or EMC standards.

2 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 reference document (including any amendments) 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.

2.1 Normative references

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

[1] ETSI ETS 300 132-1: "Equipment Engineering (EE); Power supply interface at the input to telecommunications equipment; Part 1: Operated by alternating current (ac) derived from direct current (dc) sources".

[2] ETSI EN 300 132-2: "Environmental Engineering (EE); Power supply interface at the input to telecommunications equipment; Part 2: Operated by -48 V direct current (dc)".

[3] ETSI EN 300 132-3-1: "Environmental Engineering (EE); Power supply interface at the input to telecommunications and datacom (ICT) equipment; Part 3-1: Operated by rectified current source, alternating current source or direct current source up to 400 V, Sub-part 0: Overview".

[4] IEC 60038: "IEC Standard Voltages".

2.2 Informative references

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] IEC 60445: "Basic and safety principle for man-machine interface, marking and identification - Identification of equipment terminals, conductor terminations, and conductors".

[i.2] www.electropedia.org: "Electropedia: The World's Online Electrotechnical Vocabulary".

[i.3] ETSI EN 300 132-3-2: "Environmental Engineering (EE); Power supply interface at the input to telecommunications and datacom (ICT) equipment; Part 3: Operated by rectified current source, alternating current source or direct current source up to 400 V; Sub-part 2: Alternating up to 400 V solution".

[i.4] ETSI EN 300 132-3-3: "Environmental Engineering (EE); Power supply interface at the input to telecommunications and datacom (ICT) equipment; Part 3: Operated by rectified current source, alternating current source or direct current source up to 400 V; Sub-part 3: Rectified current up to 400 V solution".

3 Definitions, symbols and abbreviations

3.1 Definitions

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

abnormal service voltage ranges: steady-state voltage ranges over which the telecommunications and datacom (ICT) equipment will not be expected to maintain normal service but will survive undamaged

area of application: any location where the interface A3 is used i.e. telecommunication centers, Radio Base Stations, datacenters and customer premises

compliance criteria:

Criteria a): The apparatus shall continue to operate as intended during and after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended.

Criteria b): Temporary loss of function or degradation of performance, which ceases after the disturbance ceases, and from which the equipment under test recovers its normal performance, without operator intervention.

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

interface A3: interface, physical point, at which power supply is connected in order to operate the telecommunications and datacom (ICT) equipment

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

nominal voltage: value of the voltage by which the electrical installation or part of the electrical installation is designated and identified

normal operating condition: typical environmental and powering conditions for operation of telecommunications and datacom (ICT) equipment, power supply, power distribution and battery

normal operating voltage: typical value of the voltage at A3 interface within the normal operating voltage range

normal operating voltage range: voltage range at A3 interface 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

normal service voltage range: range of the steady-state voltage at the "A3" interface 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 (A3 interface) of the system

power supply: power supply to which telecommunications and datacom (ICT) equipment is intended to be connected

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

telecommunications and datacom (ICT) equipment: in this context, telecommunications and datacom (ICT) equipment means telecommunication or datacommunication equipment that is a part of ICT equipment definition

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

3.2 Symbols

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

U_T	Reference Test Voltage

3.3 Abbreviations

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

AC	Alternating Current
NOTE:	Also when used as a suffix to units of measurement.
DC	Direct Current
NOTE:	Also when used as a suffix to units of measurement.
EMC	Electro Magnetic Compatibility
ICT	Information and Communication Technology
UPS	Uninterrupted Power Supply

4 Interface A3

The power supply interface, interface A3, 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.

Interface A3 is located at the power terminals of the telecommunications and datacom (ICT) equipment in accordance to IEC/EN 60445 [i.1].

The DC interface A3 is defined precisely in EN 300 132-3-1 [3].

NOTE: AC and rectified AC interface will be defined in EN 300 132-3-2 [i.3] and EN 300 132-3-3 [i.4].

Annex A gives more details on the different possible voltage wave level and shape at interface A3.

The interface A3 shall be able to coexist in all places (building, rooms or customer premises) with equipment operated by interface A defined in ETS 300 132-1 [1] and EN 300 132-2 [2].

5 Power interface requirements

Each sub-part of EN 300 132-3 will define:

- A nominal voltage (which is a naming to enable differentiating the power interface as defined by IEC definition [i.2]). The nominal voltage either in AC shall be in the voltage range defined in standard IEC 60038 [4].
- A normal service voltage range at interface A3.
- A normal operating voltage range at interface A3.
- A reference test voltage U_T at interface A3.
- An abnormal service voltage range at interface A3 under steady state conditions.
- Abnormal conditions: Voltage variations, voltage dips, short interruptions and voltage surges at interface A3.
- Specific protections for the interface A3.
- Maximum steady state currents in the normal and abnormal service voltage range.
- Inrush current limits and measurement on connection to interface A3.
- Earthing and Bonding requirements.
- Specific safety and EMC requirements.

Annex A (informative): Power supply and interface considerations

This annex explains the different power interfaces possibilities.

A.1 Possible power supply configurations

The increase of service and of energy density of the telecommunications and datacom (ICT) equipment has led to more equipment in the same existing premises and higher power consumption.

The telecom equipment are commonly powered in 48 V and the servers in AC e.g. 230 V 50 Hz in Europe.

Therefore, the A3 power interface voltage ranges proposed in the present standards series have been defined with consideration to the:

- Need to unify the power supply to all telecommunications and datacom (ICT) Equipment.
- Reduction of the power losses as well as copper cross-section area in the power distribution wires.
- Need to maintain a highly reliable power source for telecommunications and datacom (ICT) equipment in telecommunication centres or datacenters or customer premises when required.
- Complementary standards (e.g. from ETSI, ITU-T or IEC) in area not covered by the present document such as safety, EMC, building installation, power cabling, protection devices and plugs, etc.

The corresponding A3 interface is based on different possible configurations including:

- A DC power supply associated to an energy storage device (e.g. battery) with a voltage range taking into account:
  - the battery boost charging voltage (≤ 400 V);
  - the battery end of discharge voltage and voltage drop in the distribution system.
- An AC single or 3 phase sine wave source. The usual voltage at interface A3 is a 100 V to 240 V rms voltage (50 Hz) phase to neutral or 200 V to 400 V phase to phase. When an AC input voltage failure occurs, the voltage is provided by a UPS.

A specific configuration mixing rectified AC and DC may be proposed for very low cost system:

- A rectified AC source with voltage ripple of 300 Hz and (typical value 200 Vrms to 400 Vrms depending on topology). When an AC input voltage failure occurs, the power can be provided by a battery through an appropriate by-pass.
- A rectified AC source with a voltage ripple of 100 Hz (typical value 100 Vrms to 240 Vrms). When an AC input voltage failure occurs, the power can be provided by a battery through an appropriate by-pass.

A.2 Supply voltage waveforms

The voltage at interface A3 can have different wave shapes. Figures A.1 to A.5 represent these possible voltage wave shapes at the interface A3. All the equipment should accept to be supplied by this voltage.

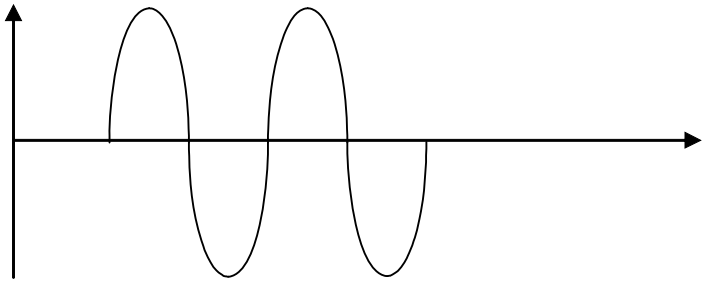

Figure A.1: Alternating voltage wave shape

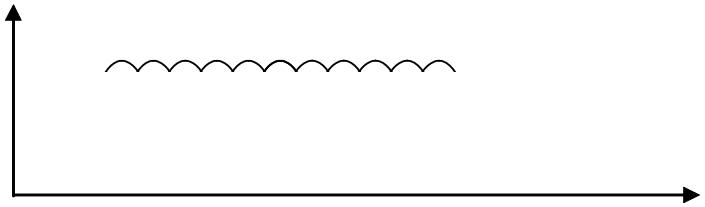

Figure A.2: Rectified three-phase voltage wave shape

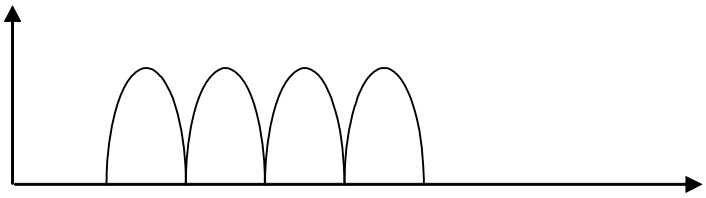

Figure A.3: Rectified single-phase voltage wave shape

Figure A.4: Rectified and filtered single-phase voltage wave shape

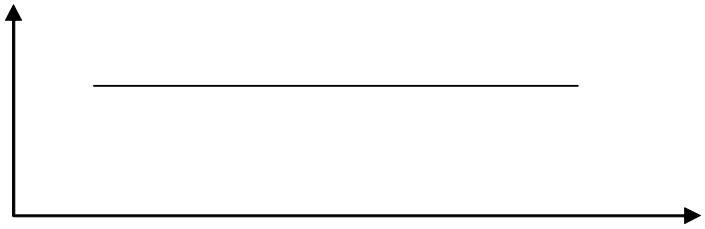

Figure A.5: Battery voltage wave shape

Annex B (informative): Bibliography

- IEC 60479-1: "Effects of current on human beings and livestock - Part 1: General aspects".
- IEC 60050-601: "International Electrotechnical Vocabulary. Chapter 601: Generation, transmission and distribution of electricity - General".

History

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