



**Environmental Engineering (EE);
Power supply interface at the input to
Information and Communication Technology (ICT)
equipment;
Part 1: Alternating Current (AC)**

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Foreword

This draft European Standard (EN) has been produced by ETSI Technical Committee Environmental Engineering (EE), and is now submitted for the combined Public Enquiry and Vote phase of the ETSI standards EN Approval Procedure.

The present document is part 1 of a multi-part deliverable covering Environmental Engineering (EE); Power supply interface at the input to Information and Communication Technology (ICT) equipment, as identified below:

Part 1: "Alternating Current (AC)";

Part 2: "-48 V Direct Current (DC)";

Part 3: "Up to 400 V Direct Current (DC)";

Proposed national transposition dates	
Date of latest announcement of this EN (doa):	3 months after ETSI publication
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	6 months after doa
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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).

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1 Scope

The present document contains requirements for the input of the ICT equipment connected to interface "A1".

The voltage at interface "A1" defined in the present document is single phase and three phase AC.

The following voltage range categories are covered:

- Narrow single phase "A1"_{n-1p} and narrow three phase "A1"_{n-3p} AC voltage range defined to comply with nominal European AC voltages defined in IEC 60038 [i.2].
- Wide single phase "A1"_{w-1p} and wide three phase "A1"_{w-3p} AC voltage range for worldwide nominal AC voltages. This wide voltage range is based on the nominal voltages defined in IEC 60038 [i.2].

The present document aims at providing compatibility between the power supply equipment and both the ICT equipment, and the different load units connected to the same interface "A1" (e.g. control/monitoring, cooling system, etc.).

The purpose of the present document is:

- to identify a power supply system with the same characteristics for all ICT equipment defined in the area of application; the area of application may be any location where the interface "A1" is used i.e. telecommunication centres, Radio Base Stations, datacentres and customer premises;
- to facilitate interworking of different (types of) loads;
- to facilitate the standardization of power supply systems for ICT equipment;
- to facilitate the installation, operation and maintenance in the same network of ICT equipment and systems from different origins. General requirements for safety and EMC are out of the scope of the present document series unless specific requirement not defined in existing safety or EMC standards.

The present document concerns the requirements for the interface between Information and Communication Technology (ICT) equipment and its power supply. It includes requirements relating to its stability and measurement. Various other references and detailed measurement and test arrangements are contained in informative annexes.

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.

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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] IEC 60947-2: "Low-voltage switchgear and controlgear - Part 2: Circuit-breakers".
- [2] IEC 60269-1: "Low-voltage fuses - Part 1: General requirements".
- [3] IEC 61000-4-5:2014+AMD1:2017: "Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test".

- [4] IEC 61000-4-11:2020: "Electromagnetic compatibility (EMC) - Part 4-11: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests for equipment with input current up to 16 A per phase".

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.

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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] ETSI ETS 300 132-1 (Edition 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".
- [i.2] IEC 60038:2009+AMD1:2021: "IEC standard voltages".
- [i.3] IEC 60050-601: "International Electrotechnical Vocabulary (IEV) Part 601: Generation, transmission and distribution of electricity - General".
- [i.4] Void.
- [i.5] Void.
- [i.6] Void.
- [i.7] Void.
- [i.8] IEC 60445: "Basic and safety principle for man-machine interface, marking and identification - Identification of equipment terminals, conductor terminations and conductors".
<http://standards.iteh.ai/catalog/standards/iec/60445-2010>
- [i.9] IEC 60898-1:2015: "Electrical accessories - Circuit-breakers for overcurrent protection for household and similar installations - Part 1: Circuit-breakers for a.c. operation".
- [i.10] IEC 60898-2: "Electrical accessories - Circuit-breakers for overcurrent protection for household and similar installations - Part 2: Circuit-breakers for AC and DC operation".
- [i.11] IEC 60364 series: "Low-voltage electrical installations".
- [i.12] IEC 62040 series: "Uninterruptible power systems (UPS)".
- [i.13] IEC 60050-351:2006: "International Electrotechnical Vocabulary (IEV) - Part 351: Control technology".

3 Definition of terms, symbols and abbreviations

3.1 Terms

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

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

area of application: any location where the interface "A1" is used i.e. telecommunication centres, Radio Base Stations, datacentres and customer premises

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

ICT equipment: device, in the telecommunication network infrastructure, that provides an ICT service

interface A: interface, physical point, at which -48 VDC power supply is connected in order to operate the ICT equipment

interface "A1": interface, physical point, at which AC power supply is connected in order to operate the ICT equipment

NOTE: "A1"_n and "A1"_w are used for different voltage ranges: narrow and wide respectively.

interface A3: interface, physical point, at which 400 VDC power supply is connected in order to operate the 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

NOTE: This definition is based on IEC 60050-601 [i.3].

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

normal service voltage range: range of the steady-state voltage at the "A1" interface over which the equipment will maintain normal service

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

reference test voltage: voltage used as a reference to define the test voltage in the present document

NOTE: The test voltage may be also a percentage of this voltage.

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

steady-state: state of a system at which all state and output variables remain constant in time while all input variables are constant

NOTE: This definition is numbered 351-24-09 in IEC 60050-351:2006 [i.13].

telecommunication centre: any location where 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:

"A1" _{n-1p}	Single phase narrow voltage range at interface "A1"
"A1" _{n-3p}	Three phase narrow voltage range at interface "A1"
"A1" _{w-1p}	Single phase wide voltage range at interface "A1"
"A1" _{w-3p}	Three phase wide voltage range at interface "A1"
I_m	Maximum steady state current drain at interface "A1"
I_t	Instantaneous surge current at interface "A1"
I_{UT}	Maximum input current (at AC RMS), stated by the manufacturer, for a fully-equipped and loaded system block behind interface "A1"
U_T	Reference test voltage for narrow voltage range
U_{TW1min}	Minimum reference test voltage for wide voltage range for single phase or 3 phase line to neutral
U_{TW1max}	Maximum reference test voltage for wide voltage range for single phase or 3 phase line to neutral
U_{TW2min}	Minimum reference test voltage for wide voltage range for 3 phase
U_{TW2max}	Maximum reference test voltage for wide voltage range for 3 phase

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	ElectroMagnetic Compatibility
EUT	Equipment Under Test
ICT	Information and Communication Technology
L	Phase conductor
LISN	Line Impedance Stabilization Networks
N	Neutral conductor
PE	Protective Earth
RMS	Root Mean Square
UPS	Uninterruptible Power Supply
VAC	Volts Alternating Current
VDC	Volts Direct Current

4 Power Interface "A1"

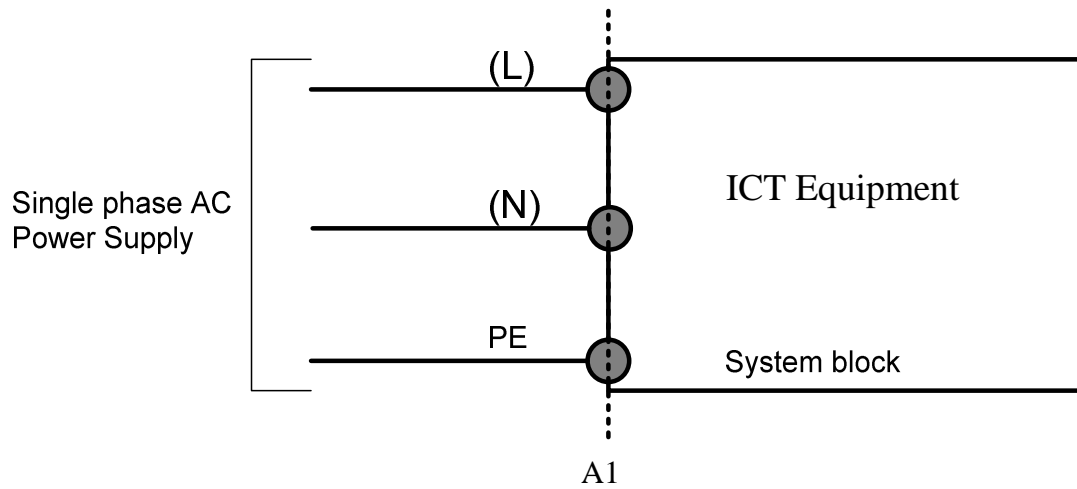
The power supply interface, interface "A1" of figure 1, is a physical point to which all the requirements are related. This point is situated between the power supply system(s) and the power consuming ICT equipment of the area of application defined in the scope of the present document.

An example of configurations in which interface "A1" is identified is given in annex B.

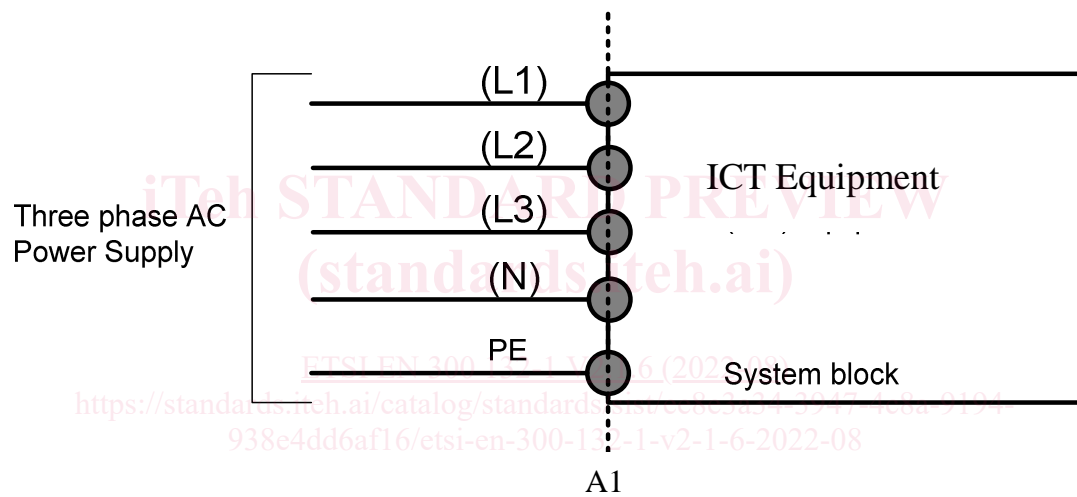
Interface "A1" is located at the power terminals of the ICT equipment or system as defined by the manufacturer in accordance to IEC 60445 [i.8].

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

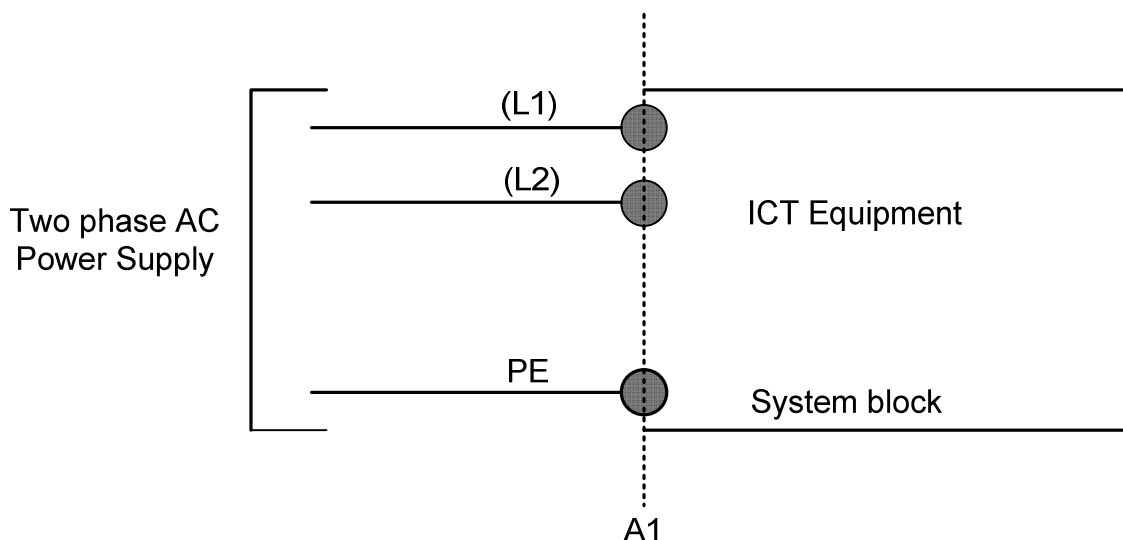
NOTE 2: The power supply can be derived from AC grid e.g. through AC bypass of UPS or inverters.



- (L) Live AC terminal in single phase supply.
- (N) Neutral AC terminal.
- PE Protective Earth.



- (L1, L2, L3) Live AC terminals in 3 phases supply.
- (N) Optional Neutral AC terminal.
- PE Protective Earth.



(L1, L2) Live AC terminals in 2 phases supply.
PE Protective Earth.

Figure 1: General identification of the interface "A1" in single, dual and 3 phase AC supply

5 AC interface requirements "A1"

5.0 Introduction (standards.iteh.ai)

The definition of the AC interface voltages ranges and typical operating voltage values are defined in the following subclauses of clause 5.

5.1 Nominal voltage at interface "A1"

In Europe, the AC input voltage of the ICT equipment shall comply with the nominal single phase voltage of 230 V AC and for three phase it shall comply with 400 V AC at a power frequency of 50 Hz.

NOTE 1: Nominal voltage as defined in table 1 of IEC 60038 [i.2].

ICT equipment intended for worldwide use is recommended to comply with nominal voltages and frequencies defined in table 1 of the present document.

NOTE 2: Nominal voltages as defined in table 1 of the present document and table 6 of IEC 60038 [i.2], except for 115 V and 127 V AC single phase which is also used in some countries.

Table 1: Nominal voltages

AC Single phase voltages (50 Hz or 60 Hz)	AC Three phase voltages (50 Hz or 60 Hz)
100, 110, 115, 120, 127, 200, 220, 230, 240	200, 208, 220, 240, 380, 400, 415