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Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Environmental Engineering (EE).

Modal verbs terminology

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Introduction

The present document gives guidance on installation, connection and operation of power supply systems for telecommunication / datacom (ICT) systems and equipment. Also are considered items of equipment with their own power supply, which are connected to form a complete system.

1 Scope

The present document gives guidance on installation, connection and operation of power supply systems for telecommunication / datacom installations and equipments. Also are considered items of equipment with their own power supply, which are connected to form a complete system installation.

The present document contains definitions for power supply and distribution systems in complement to power interfaces standards ETSI EN 300 132 series [5], [6], [26].

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 in the ETSI docbox.

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 EN 60038: "IEC standard voltages".

[2] ETSI EN 300 386: "Telecommunication network equipment; ElectroMagnetic Compatibility (EMC) requirements; Harmonised Standard covering the essential requirements of the Directive 2014/30/EU".

[3] EN 60950-1: "Information technology equipment - Safety - Part 1: General requirements", (produced by CENELEC).

[4] EN 60896-21: "Stationary lead-acid batteries - Part 21: Valve regulated types - Methods of test", (produced by CENELEC).

[5] ETSI EN 300 132-1: "Environmental Engineering (EE); Power supply interface at the input to Information and Communication Technology (ICT) equipment; Part 1: Alternating Current (AC)".

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

[7] ETSI EN 302 099: "Environmental Engineering (EE); Powering of equipment in access network".

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

[9] Recommendation ITU-T K.20: "Resistibility of telecommunication equipment installed in a telecommunications centre to overvoltages and overcurrents".

[10] Recommendation ITU-T K.21: "Resistibility of telecommunication equipment installed in customer premises to overvoltages and overcurrents".

[11] Recommendation ITU-T K.45: "Resistibility of telecommunication equipment installed in the access and trunk networks to overvoltages and overcurrents".

[12] HD 384 (all parts)/HD 60364: "Electrical installations of buildings", (produced by CENELEC).

[13] ETSI EN 301 489-1: "ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonised Standard for ElectroMagnetic Compatibility".

[14] EN 61000-3-2: "Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)", (produced by CENELEC).

[15] EN 61000-3-3: "Electromagnetic compatibility (EMC) - Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection", (produced by CENELEC).

[16] Recommendation ITU-T P.53: "Psophometer for use on telephone-type circuits".

[17] EN 50310: "Application of equipotential bonding and earthing in buildings with information technology equipment", (produced by CENELEC).

[18] EN 61000-4-11: "Electromagnetic compatibility (EMC) - Part 4-11: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests", (produced by CENELEC).

[19] EN 50174-2: "Information technology - Cabling installation - Part 2: Installation planning and practices inside buildings", (produced by CENELEC).

[20] EN 62040-1-1: "Uninterruptible power systems (UPS) - Part 1-1: General and safety requirements for UPS used in operator access areas", (produced by CENELEC).

[21] EN 62040-1-2: "Uninterruptible power systems (UPS) - Part 1-2: General and safety requirements for UPS used in restricted access locations", (produced by CENELEC).

[22] EN 60896-11: "Stationary lead-acid batteries - Part 11: Vented types - General requirements and methods of tests", (produced by CENELEC).

[23] EN 62310-1: "Static transfer systems (STS) - Part 1: General and safety requirements", (produced by CENELEC).

[24] EN 60896-22: "Stationary lead-acid batteries - Part 22: Valve regulated types - Requirements", (produced by CENELEC).

[25] ETSI EN 301 605: "Environmental Engineering (EE); Earthing and bonding of 400 V DC data and telecom (ICT) equipment".

[26] ETSI EN 300 132-3 (V2.3.1) (2023-01): "Environmental Engineering (EE); Power supply interface at the input of Information and Communication Technology (ICT) equipment; Part 3: Up to 400 V Direct Current (DC)".

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] IEC 60050-601: "International Electrotechnical Vocabulary. Chapter 601: Generation, transmission and distribution of electricity - General".

[i.2] EN 62368-1 Ed. 1.0: "Audio/Video, Information and Communication Technology Equipment - Part 1: Safety requirements", (produced by CENELEC).

[i.3] IEC EN 60445: "Basic and safety principle for man-machine interface, marking and identification-Identification of equipment terminals, conductor terminations, and conductors".

[i.4] ETSI TR 100 283: "Environmental Engineering (EE); Transient voltages at Interface "A" on telecommunications direct current (DC) power distributions".

[i.5] 19 Pfl1: "Voltage limits for 60 V consumers in telecommunication installations of the Deutsche Telekom".

3 Definition of terms, symbols and abbreviations

3.1 Terms

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

current-using equipment: either a further power supply system or a telecommunication equipment

NOTE: The telecommunication equipment with associated power supply may be considered as telecommunication installation or telecommunication equipment.

disturbance: electromagnetic disturbance having components in the radio frequency range

immunity: ability of a device, equipment or system to perform without degradation in the presence of an electromagnetic disturbance

power supply system: electrical equipment, which makes available energy obtained from a primary power source (e.g. AC distribution) in a form suitable for the current-using equipment

radio interference: degradation of the reception of a wanted signal caused by radio frequency disturbance

supply voltage: voltage preferably obtained from the public distribution system or other primary electric power sources

Transfer Switch (TS): integrated automatic bypass switch used in the UPS, which can be fully static, fully electromechanical or hybrid

3.2 Symbols

Void.

3.3 Abbreviations

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

AC	Alternating Current
DC	Direct Current
EMC	Electro Magnetic Compatibility
ERM	Electromagnetic Radio spectrum Matters
HD	Harmonization Document
ICT	Information and Communication Technology
MOS	Metal Oxide Semiconductor
PSI	Power Supply Interface
SBS	Systems Bypass Switch
SD	Safe Disconnection
STS	Static Transfer Switches (for the stand-alone static switches)
TS	Transfer Switch
UPS	Uninterruptible Power Supply

4 Types of power supply systems

4.0 Introduction

In telecommunication and datacom installations and equipment the designation of a power supply system refers to its output.

In this sense there are DC and AC supplies. The operating modes described below are basic forms, which may be developed into more complex arrangements.

4.1 DC supply

4.1.1 Mains operation

The current-using equipment is supplied with DC voltage obtained by a rectifier from the AC system (see figure 1).

The nominal voltage is a normative definition used to enable differentiating power interfaces as defined in IEC 60050-601 [i.1].

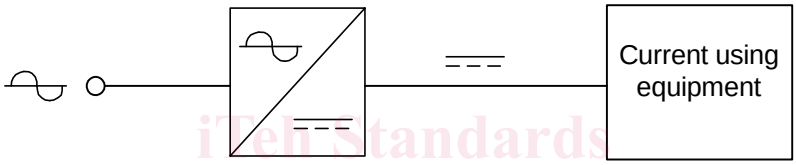

Figure 1: Principle of mains operation

4.1.2 Battery operation

The current-using equipment is supplied from a battery. Both primary and secondary cells (Accumulators) can be used as batteries. The Accumulator is disconnected from the current-using equipment for charging (see figure 2).

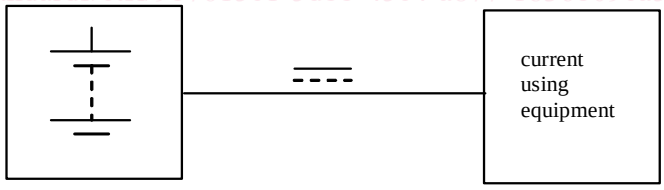

Figure 2: Principle of battery operation

4.1.3 Floating/Parallel operation

4.1.3.0 General principles

The current-using equipment is connected continuously to a rectifier and battery (see figure 3).

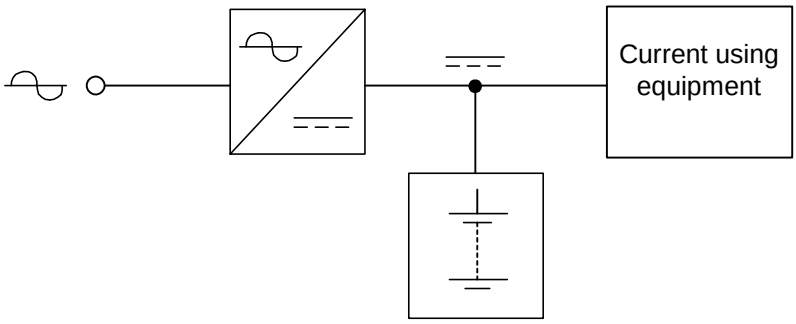

Figure 3: Principle of parallel operation

The current-using equipment is supplied in parallel operation; the rectifier being dimensioned in such a way that it can cover the total power consumption of the current-using equipment and in addition supply an appropriate charging current for the battery (see figure 3).

With this configuration the battery is continuously ready for operation in a fully charged condition. If the mains AC voltage is outside of the specification (e.g. fails, reduction of voltage, high harmonics), the current-using equipment continues to be supplied without interruption.

Parallel operation includes a very common charging mode known as floating mode and other charging modes such as intermittent charge.

Floating charge is a charging mode where the self-discharge of the battery is compensated by maintaining a sufficient voltage to the battery. The charging voltage can be varied due to temperature compensation.

Intermittent charge is a charging mode where the self-discharge of the battery is compensated by periodically raising the voltage of rectifiers for short periods. Between these periods the rectifier voltage is left lower than it should be in floating mode. The aim is to reduce plate corrosion and loss of water, as well as to reduce the risk of thermal runaway. This may help to prolong the life span of batteries used in outdoor equipments or areas with high ambient temperature.

4.1.3.1 DC switch operation

4.1.3.1.0 Operation between rectifier and battery

The power requirement of the current using equipment is normally provided by a rectifier. A disconnected battery is maintained in a charged condition by a separate charger. If the rectifier fails, the current-using equipment is switched to the battery and supplied by the latter (see figure 4).