BS EN 50600-2-2:2019

BSI Standards Publication

Information technology - Data centre facilities and infrastructures

Part 2-2: Power supply and distribution

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National foreword

This British Standard is the UK implementation of EN 50600-2-2:2019. It supersedes BS EN 50600-2-2:2014, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee TCT/7, Telecommunications - Installation requirements.

A list of organizations represented on this committee can be obtained on request to its secretary.

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Published by BSI Standards Limited 2019

ISBN 978 0 539 00321 5

ICS 91.140.50; 35.110; 35.020

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This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 June 2019.

Amendments/corrigenda issued since publication

Date	Text affected

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 50600-2-2

June 2019

ICS 35.020; 35.110; 91.140.50

Supersedes EN 50600-2-2:2014

English Version

Information technology - Data centre facilities and infrastructures - Part 2-2: Power supply and distribution

Technologie de l'information - Installation et infrastructures de centres de traitement de données

Informationstechnik - Einrichtungen und Infrastrukturen von Rechenzentren - Teil 2-2: Stromversorgung

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European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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Ref. No. EN 50600-2-2:2019 E

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European foreword

This document (EN 50600-2-2:2019) has been prepared by CLC/TC 215 “Electrotechnical aspects of telecommunication equipment”.

The following dates are fixed:

- latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2020-04-29
- latest date by which the national standards conflicting with this document have to be withdrawn (dow) 2022-04-29

This document will supersede EN 50600-2-2:2014.

The following changes have been made:

a) title modified to emphasize distinction between power supply and power distribution requirements;

b) Clause 5 updated, in particular subclauses 5.1 regarding the power supply to the data centre and 5.2 on the power distribution within the data centre;

c) availability requirements in Clause 6 revised and aligned with EN 50600-1:2018 and EN 50600-2-3:2018;

d) physical security requirements revised, mainly regarding the power distribution in the data centre (see 7.3.2);

e) granularity level requirements amended (see 8.2 to 8.4);

f) Annex A removed;

g) minor technical and editorial improvements to the whole document.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

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Introduction

The unrestricted access to internet-based information demanded by the information society has led to an exponential growth of both internet traffic and the volume of stored/retrieved data. Data centres are housing and supporting the information technology and network telecommunications equipment for data processing, data storage and data transport. They are required both by network operators (delivering those services to customer premises) and by enterprises within those customer premises.

Data centres usually need to provide modular, scalable and flexible facilities and infrastructures to easily accommodate the rapidly changing requirements of the market. In addition, energy consumption of data centres has become critical both from an environmental point of view (reduction of environmental footprint) and with respect to economical considerations (cost of energy) for the data centre operator.

The implementation of data centres varies in terms of:

a) purpose (enterprise, co-location, co-hosting or network operator facilities);

b) security level;

c) physical size;

d) accommodation (mobile, temporary and permanent constructions).

The needs of data centres also vary in terms of availability of service, the provision of security and the objectives for energy efficiency. These needs and objectives influence the design of data centres in terms of building construction, power distribution, environmental control, telecommunications cabling and physical security as well as the operation of the data centre. Effective management and operational information is required to monitor achievement of the defined needs and objectives.

Recognizing the substantial resource consumption, particularly of energy, of larger data centres, it is also important to provide tools for the assessment of that consumption both in terms of overall value and of source mix and to provide Key Performance Indicators (KPIs) to evaluate trends and drive performance improvements.

At the time of publication of this European Standard, EN 50600 series is designed as a framework of standards and technical reports covering the design, the operation and management as well as the key performance indicators for energy efficient operation of the data centre.

The EN 50600-2 series defines the requirements for the data centre design.

The EN 50600-3 series defines the requirements for the operation and the management of the data centre.

The EN 50600-4 series defines the key performance indicators for the data centre.

The CLC/TR 50600-99-X Technical Reports cover recommended practices and guidance for specific topics around data centre operation and design.

This series of European Standards specifies requirements and recommendations to support the various parties involved in the design, planning, procurement, integration, installation, operation and maintenance of facilities and infrastructures within data centres. These parties include:

1) owners, operators, facility managers, ICT managers, project managers, main contractors;

2) consulting engineers, architects, building designers and builders, system and installation designers, auditors, test and commissioning agents;

3) facility and infrastructure integrators, suppliers of equipment;

4) installers, maintainers.

At the time of publication of this European Standard, EN 50600-2 series comprises the following standards:

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EN 50600-2-1: *Information technology — Data centre facilities and infrastructures — Part 2-1: Building construction*;

EN 50600-2-2: *Information technology — Data centre facilities and infrastructures — Part 2-2: Power supply and distribution*;

EN 50600-2-3: *Information technology — Data centre facilities and infrastructures — Part 2-3: Environmental control*;

EN 50600-2-4: *Information technology — Data centre facilities and infrastructures — Part 2-4: Telecommunications cabling infrastructure*;

EN 50600-2-5: *Information technology — Data centre facilities and infrastructures — Part 2-5: Security systems*.

The inter-relationship of the standards and technical reports within the EN 50600 series is shown in Figure 1.

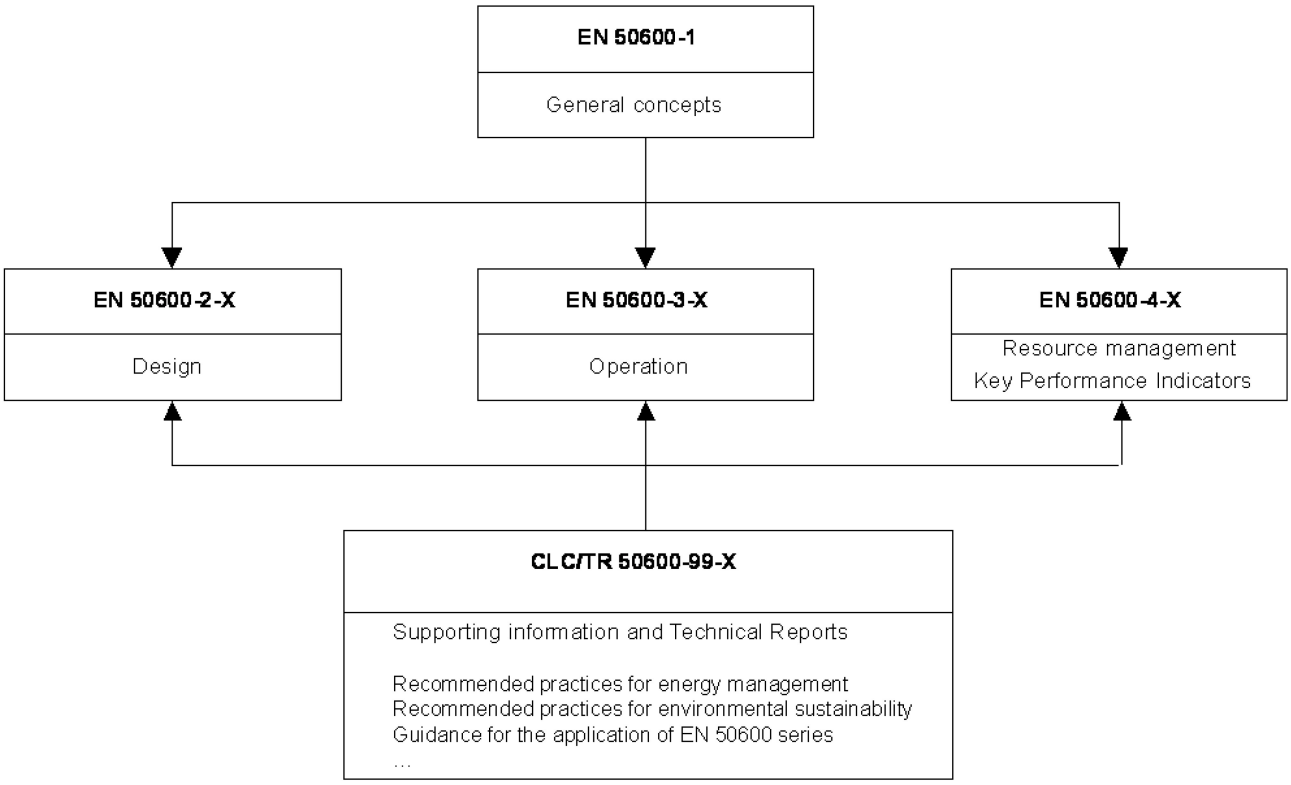

Figure 1 — Schematic relationship between the EN 50600 standard

EN 50600-2-X standards specify requirements and recommendations for particular facilities and infrastructures to support the relevant classification for “availability”, “physical security” and “energy efficiency enablement” selected from EN 50600-1.

EN 50600-3-X documents specify requirements and recommendations for data centre operations, processes and management.

EN 50600-4-X documents specify requirements and recommendations for key performance indicators (KPIs) used to assess and improve the resource usage efficiency and effectiveness, respectively, of a data centre.

This European Standard addresses facilities and infrastructures for power supplies to, and power distribution within, data centres together with the interfaces for monitoring the performance of those facilities and infrastructures in line with EN 50600-3 series and EN 50600-4 series standards (in accordance with the requirements of EN 50600-1). The line diagrams used in certain Figures are not intended to replace the more familiar electrical circuit diagrams associated with power supply and distribution systems which are included where relevant.

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This European Standard is intended for use by and collaboration between architects, building designers and builders, system and installation designers.

This series of European Standards does not address the selection of information technology and network telecommunications equipment, software and associated configuration issues.

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1 Scope

This document addresses power supplies to, and power distribution within, data centres based upon the criteria and classifications for “availability”, “physical security” and “energy efficiency enablement” within EN 50600-1.

This document specifies requirements and recommendations for the following:

a) power supplies to data centres;

b) power distribution systems to all equipment within data centres;

c) telecommunications infrastructure bonding;

d) lightning protection;

e) devices for the measurement of the power consumption and power quality characteristics at points along the power distribution system and their integration within management tools.

Safety and electromagnetic compatibility (EMC) requirements are outside the scope of this European Standard and are covered by other standards and regulations. However, information given in this European Standard can be of assistance in meeting these standards and regulations.

Conformance of data centres to the present document is covered in Clause 4.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 13160 (all parts), *Leak detection systems*

EN 50160:2010, *Voltage characteristics of electricity supplied by public electricity networks*

EN 50174-2, *Information technology - Cabling installation - Part 2: Installation planning and practices inside buildings*

EN 50174-3, *Information technology - Cabling installation - Part 3: Installation planning and practices outside buildings*

EN 50310, *Telecommunications bonding networks for buildings and other structures*

EN 50600-1, *Information technology - Data centre facilities and infrastructures - Part 1: General concepts*

EN 50600-2-3, *Information technology - Data centre facilities and infrastructures - Part 2-3: Environmental control*

EN 50600-2-5, *Information technology - Data centre facilities and infrastructures - Part 2-5: Security systems*

EN 60076-11, *Power transformers - Part 11: Dry-type transformers*

EN 60947 (all parts), *Low-voltage switchgear and controlgear (IEC 60947, all parts)*

EN 61000-2-4:2002, *Electromagnetic compatibility (EMC) - Part 2-4: Environment - Compatibility levels in industrial plants for low-frequency conducted disturbances*

EN 61439 (all parts), Low-voltage switchgear and controlgear assemblies (IEC 61439, all parts)

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EN 61557-12:2008, *Electrical safety in low voltage distribution systems up to 1 000 V a.c. and 1 500 V d.c. - Equipment for testing, measuring or monitoring of protective measures - Part 12: Performance measuring and monitoring devices (PMD)*

EN 61869-2:2012, *Instrument transformers - Part 2: Additional requirements for current transformers*

EN 62040 (all parts), *Uninterruptible power systems (UPS) (IEC 62040, all parts)*

EN 62053-21:2003, *Electricity metering equipment (a.c.) - Particular requirements - Part 21: Static meters for active energy (classes 1 and 2)*

EN 62053-22:2003, *Electricity metering equipment (a.c.) - Particular requirements - Part 22: Static meters for active energy (classes 0,2 S and 0,5 S)*

EN 62271-200:2012, *High-voltage switchgear and controlgear. Part 200. AC metal-enclosed switchgear and controlgear for rated voltages above 1 kV and up to and including 52 kV*

EN 62305 (all parts), *Protection against lightning (IEC 62305, all parts)*

EN 62305-4, *Protection against lightning - Part 4: Electrical and electronic systems within structures*

EN 62586-1:2017, *Power quality measurement in power supply systems – Part 1: Power quality instruments (PQI)*

EN 62586-2:2017, *Power quality measurement in power supply systems – Part 2: Functional tests and uncertainty requirements*

EN 62974-1, *Monitoring and measuring systems used for data collection, gathering and analysis - Part 1: Device requirements*

EN 88528-11, *Reciprocating internal combustion engine driven alternating current generating sets - Part 11: Rotary uninterruptible power systems - Performance requirements and test methods*

HD 60364 (all parts), *Low-voltage electrical installations*

3 Terms, definitions and abbreviations

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 50600-1 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

• IEC Electropedia: available at http://www.electropedia.org/

• ISO Online browsing platform: available at http://www.iso.org/obp

3.1.1
active power
under periodic conditions, mean value, taken over one period T, of the instantaneous power p

$$P = \frac{1}{T}\int_0^T p\,dt$$

Note 1 to entry: Under sinusoidal conditions, the active power is the real part of the complex power $\underline{S}$, thus P = Re $\underline{S}$.

Note 2 to entry: The coherent SI unit for active power is watt, W.

[SOURCE: IEC 60050-131:2002, 131-11-42]

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3.1.2
additional supply
power supply that provides power in the event of failure of primary and/or secondary supply

3.1.3
apparent power
product of the rms voltage U between the terminals of a two-terminal element or two-terminal circuit and the rms electric current I in the element or circuit $S = UI$

Note 1 to entry: Under sinusoidal conditions, the apparent power is the modulus of the complex power $\underline{S}$, thus $S = |\underline{S}|$.

Note 2 to entry: The coherent SI unit for apparent power is voltampere, VA.

[SOURCE: IEC 60050-131:2002, 131-11-41]

3.1.4
capacitive load
load that is capacitive, so that the alternating current is out of phase with and leads the voltage

3.1.5
catenary
wire hung at a specific tension between supporting structures of power cabling

3.1.6
demarcation point
virtual interface between the power supply system and power distribution system infrastructures

3.1.7
diverse route
alternative, separate, pathway intended to provide adequate segregation from another pathway, in order to provide resilient service provision in the event of physical damage to one of the pathways

3.1.8
dual-corded equipment
equipment served by multiple power supply input interfaces

3.1.9
emergency power off
designated device to provide emergency switching which disconnects power from one or more data centre facilities, infrastructures or spaces

Note 1 to entry: The configuration and function of emergency power off devices can be subject to national or local regulations.

3.1.10
fire compartment
discrete zone designed to contain a fire within that zone

3.1.11
high voltage
voltage whose nominal r.m.s. value is 36 kV < U_n ≤ 150 kV

Note 1 to entry: Because of existing network structures, in some countries the boundary between MV and HV can be different.

[SOURCE: EN 50160:2010, 3.7]

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3.1.12
inductive load
load that is inductive, so that the alternating current is out of phase with and lags behind the voltage

3.1.13
information technology equipment
equipment providing data storage, processing and transport services together with equipment dedicated to providing direct connection to core and/or access networks

3.1.14
IT load
electrical consumption of all the information technology equipment measured at its input terminals including all on-board integrated power supplies and cooling fans

3.1.15
load factor
ratio, expressed as a numerical value or as a percentage, of the consumption within a specified period (year, month, day, etc.), to the consumption that would result from continuous use of the maximum or other specified demand occurring within the same period

Note 1 to entry: This term should not be used without specifying the demand and the period to which it relates.

Note 2 to entry: The load factor for a given demand is also equal to the ratio of the utilization time to the time in hours within the same period.

[SOURCE: IEC 60050-691:1973, 691-10-02]

3.1.16
locally protected supply provision
sockets which continue to deliver power to connected equipment for a defined period following failure of power supply and distribution equipment by means of a battery supply or UPS adjacent to, or co-located with, those sockets (e.g. emergency lighting)

3.1.17
low voltage
voltage whose nominal r.m.s. value is $U_n \leq 1$ kV

[SOURCE: EN 50160:2010, 3.9]

3.1.18
Main-Tie-Tie-Main
electrical connection between two power supply or power distribution circuits which allows current to flow in either direction and containing two circuit breakers enabling maintenance while one of the circuits is active

3.1.19
medium voltage
voltage whose nominal r.m.s. value is 1 kV < $U_n \leq 36$ kV

Note 1 to entry: Because of existing network structures, in some countries the boundary between MV and HV can be different.

[SOURCE: EN 50160:2010, 3.11]

3.1.20
pathway
defined route for cables between termination points

[SOURCE: EN 50174-1:2018, 3.1.31]

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3.1.21
power factor
under periodic conditions, ratio of the absolute value of the active power P to the apparent power S: $\lambda = |P|/S$

Note 1 to entry: The ratio of the active (real) power flowing to the load to the apparent power (as a result of the capacitive or inductive nature of the load) and is a dimensionless number between 0 and 1.

[SOURCE: IEC 60050-131:2002, 131-11-46, modified: Note 1 to entry reworded]

3.1.22
protected supply provision
no break protected supply provision
sockets which continue to deliver power to connected equipment for a defined period following failure of power supply and distribution equipment

3.1.23
primary distribution equipment
equipment which is required to manage, control and convert incoming power supplies (primary, secondary and, where appropriate, additional) in a form suitable for distribution by secondary distribution equipment

3.1.24
primary supply
principal power supply that provides power to the data centre under normal operating conditions

3.1.25
resistive load
load in which the alternating current is in phase with the voltage

Note 1 to entry: The total reactance is zero.

3.1.26
secondary distribution equipment
equipment which is required to manage, control and distribute the power provided by the primary distribution equipment to the short-break, protected and unprotected sockets within the data centre and to the tertiary distribution equipment

Note 1 to entry: The power supply may be single-phase AC, three-phase AC or DC. If there is a change from 3-phase to 1-phase supply, this is generally achieved at the secondary distribution equipment that is served directly from the primary distribution equipment.

3.1.27
secondary supply
power supply independent from, and that is continuously available to be used to provide power to the data centre following the disruption of, the primary power supply

Note 1 to entry: a second feed to a separate transformer from the same grid is not a secondary supply.

3.1.28
short-break supply provision
sockets which, upon failure of power supply and distribution equipment, will be provided with power from an additional supply after a defined period

3.1.29
socket
connection enabling supply of power to attached equipment

Note 1 to entry: This can be a de-mateable or a hardwired connection.

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