



SLOVENSKI STANDARD SIST EN 50600-2-1:2021

01-junij-2021

Nadomešča:
SIST EN 50600-2-1:2014

**Informacijska tehnologija - Naprave in infrastruktura podatkovnih centrov - 2-1.
del: Konstrukcija stavbe**

Information technology - Data centre facilities and infrastructures - Part 2-1: Building construction

Informationstechnik - Einrichtungen und Infrastrukturen von Rechenzentren - Teil 2-1: Gebäudekonstruktion

Technologie de l'information - Installations et infrastructures de centres de traitement de données - Partie 2-1: Construction des bâtiments

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Ta slovenski standard je istoveten z: EN 50600-2-1:2021

ICS:

35.020	Informacijska tehnika in tehnologija na splošno	Information technology (IT) in general
35.110	Omreževanje	Networking
91.140.50	Sistemi za oskrbo z elektriko	Electricity supply systems

SIST EN 50600-2-1:2021 en,fr

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EUROPEAN STANDARD

EN 50600-2-1

NORME EUROPÉENNE

EUROPÄISCHE NORM

April 2021

ICS 35.020; 35.110; 91.140.50

Supersedes EN 50600-2-1:2014 and all of its
amendments and corrigenda (if any)

English Version

**Information technology - Data centre facilities and infrastructures
- Part 2-1: Building construction**Technologie de l'information - Installation et infrastructures
de centres de traitement de données - Partie 2-1:
Construction des bâtimentsInformationstechnik - Einrichtungen und Infrastrukturen von
Rechenzentren - Teil 2-1: Gebäudekonstruktion

This European Standard was approved by CENELEC on 2021-03-22. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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EN 50600-2-1:2021 (E)**European foreword**

This document (EN 50600-2-1:2021) 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 (dop) 2022-03-22
implemented at national level by publication of an
identical national standard or by endorsement
- latest date by which the national standards (dow) 2024-03-22
conflicting with this document have to be withdrawn

This document supersedes EN 50600-2-1:2014 and all of its amendments and corrigenda (if any).

This document includes the following significant technical changes with respect to EN 50600-2-1:2014:

- a) the document has been completely revised and restructured;
- b) the interrelationship between this document and EN 50600-2-5 concerning constructional prerequisites for the implementation of security concepts and desired security systems has been more clearly presented;
- c) Clause 6 “Site configuration” has been split and relevant subclauses have been moved into a new Clause 7 “Outside spaces”;
- d) Clause 7 “Building construction” has been completely reworked to present all requirements and recommendations in a single Clause 8;
- e) Clause 8 “Data centre spaces and access routes” has been revised to focus on the design of data centre spaces (now Clause 9);
- f) a new Clause 10 “Construction of data centre spaces” has been added;
- g) Clause 9 “Fire compartments, fire barriers and fire suppression systems” has been revised (now Clause 11);
- h) Annex A on additional requirements and recommendations has been removed;
- i) Annex B on physical protection against external hazards has been revised as Annex A “Building materials”;
- j) a new Annex B summarizing the requirements and recommendations of Clause 5 has been added;
- k) Clauses 1 to 4 have been amended accordingly.

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.

This document has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association.

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 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 important in order 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 document, the EN 50600 series is designed as a framework of standards, technical specifications and technical reports covering the design, the operation and management, the key performance indicators for energy efficient operation of the data centre as well as a data centre maturity model.

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/TS 50600-5 series defines the data centre maturity model requirements and recommendations.

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 documents 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.

EN 50600-2-1:2021 (E)

At the time of publication of this document, the EN 50600-2 series comprises the following documents:

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*.

CLC/TS 50600-2-10, *Information technology — Data centre facilities and infrastructures — Part 2-10: Earthquake risk and impact analysis*

The inter-relationship of the documents within the EN 50600 series is shown in Figure 1.

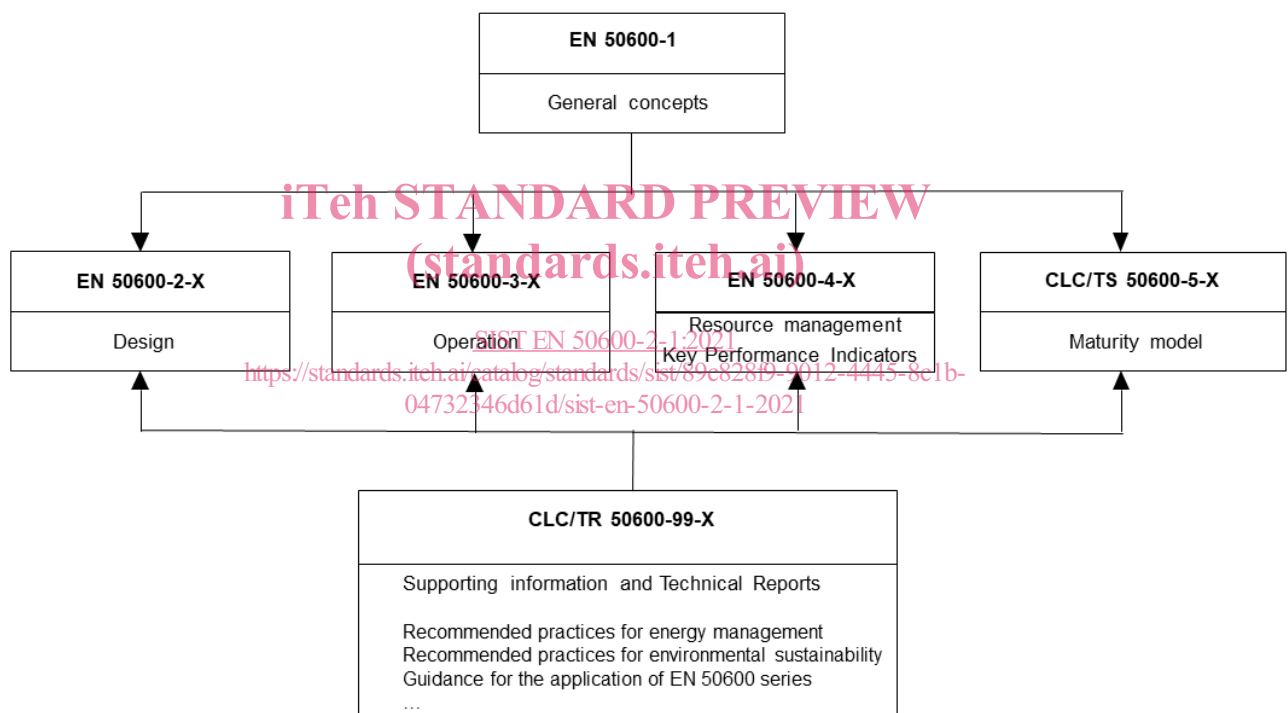


Figure 1 — Schematic relationship between the EN 50600 series standards

EN 50600-2-X documents 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 document addresses the site selection and the building design of data centres; it addresses security issues from a constructional point of view, whereas EN 50600-2-5 specifies the security system requirements of those facilities and infrastructures (in accordance with the requirements of EN 50600-1).

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

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

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EN 50600-2-1:2021 (E)**1 Scope**

This document gives guidelines for the construction of buildings and other structures which provide accommodation for data centres based upon the criteria and classification for “physical security” within EN 50600-1 in support of availability.

This document specifies requirements and recommendations for the following:

- a) location and site selection (taking in to account natural environment and adjacencies);
- b) protection from environmental risks;
- c) site configuration;
- d) building construction;
- e) building configuration;
- f) provision of access;
- g) intrusion protection;
- h) physical fire protection;
- i) protection against damage from water;
- j) quality construction measures.

Safety and electromagnetic compatibility (EMC) requirements are outside the scope of this document and are covered by other standards and regulations. However, information given in this document 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 81 (all parts), *Safety rules for the construction and installation of lifts - Special lifts for the transport of persons and goods*

EN 1366-3, *Fire resistance tests for service installations - Part 3: Penetration seals*

EN 1627:2011, *Pedestrian doorsets, windows, curtain walling, grilles and shutters - Burglar resistance - Requirements and classification*

EN 1634 (all parts), *Fire resistance and smoke control tests for door and shutter assemblies, openable windows and elements of building hardware*

EN 1991-1-1, *Eurocode 1: Actions on structures - Part 1-1: General actions - Densities, self-weight, imposed loads for buildings*

EN 12825:2001, *Raised access floors*

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

EN 50600-1:2019, *Information technology - Data centre facilities and infrastructures - Part 1: General concepts*

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*

CLC/TS 50600-2-10, *Information technology - Data centre facilities and infrastructures - Part 2-10: Earthquake risk and impact analysis*

EN 50600-3-1, *Information technology - Data centre facilities and infrastructures - Part 3-1: Management and operational information*

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:

— ISO Online browsing platform: available at <https://www.iso.org/obp>

— IEC Electropedia: available at <http://www.electropedia.org/>

<https://standards.iteh.ai/catalog/standards/sist/89c828f9-9012-4445-8c1b-04732346d61d/sist-en-50600-2-1-2021>

3.1.1 effective height of free-standing barrier

h_e

shortest distance between any point on the top of the permanent part of the free-standing barrier (excluding any toppings) and the surface of the supporting ground when measured in the plane of the barrier

3.1.2 free-standing barrier

wall, fence, gate, turnstile or other similar self-supporting barrier, and their associated foundations, designed to prevent entry to a space of a given Protection Class

3.1.3 topping

construction, added to the top of a free-standing barrier, and designed to be an effective intruder deterrent or for a decorative display of security

3.1.4 modular construction

construction method which uses a system of prefabricated elements and assemblies

3.1.5 pathway

defined route of different media between identified points

Note 1 to entry: Examples of media are bus bars, cables, conduits, ducts, pipes.

EN 50600-2-1:2021 (E)**3.1.6****raised access floor**

system consisting of completely removable and interchangeable floor panels that are supported on an adjustable substructure to allow the area beneath the raised access floor panels to be used by building services

3.2 Abbreviations

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

AHU	Air handling unit
HVAC	Heating, Ventilation, Air Conditioning
IT	Information Technology
M&E	Mechanical and electrical
PDU	Power distribution unit
UPS	Uninterruptible Power System

4 Conformance

For a data centre to conform to this document:

- its location shall have been selected following a site assessment as required in Clause 5 (see also Annex B);
- it shall comply with the site requirements of Clause 6;
- it shall meet the requirements of Clause 7 where the data centre spaces are outside buildings;
- it shall meet the building construction requirements of Clause 8 where the data centre spaces are within buildings;
- it shall meet the building configuration and construction requirements detailed in Clauses 9 and 10;
- it shall meet the requirements of physical fire protection of Clause 11.

5 Location**5.1 Assessment of location****5.1.1 Requirements**

The location of a site for a data centre can be assessed either for a “green field” construction of a new data centre or the evaluation of a “brown field” existing site. The location shall be assessed against the following criteria:

- geographical location (see 5.2);
- natural environment and adjacencies (see 5.3);
- utility provision (see 5.4);
- budgetary factors such as site costs and cost to bring utilities to the site.

5.1.2 Recommendations

Availability of personnel (operational personnel, security personnel) and public transport opportunities should be considered.

5.2 Geographical location

5.2.1 Requirements

The impact of the elevation above sea level which can have a direct influence on the performance of equipment shall be considered.

5.2.2 Recommendations

The choice of a location of a new data centre should consider:

- a) assessment of its impact on the environment;
- b) acceptance by the local community;
- c) any opportunities to take advantage of renewable sources of energy (e.g. wind, solar, aerothermal, geothermal, hydrothermal and ocean energy, hydropower, biomass, landfill gas, sewage treatment plant gas and biogas);
- d) any opportunities to take advantage of the reuse of energy (e.g. thermal) produced by the data centre.

5.3 Environmental risk analysis

5.3.1 General

An environmental risk analysis shall be undertaken addressing the natural environment (see 5.3.2) and adjacencies (see 5.3.3).

The results of the environmental risk analysis shall be considered during design of the data centre. Where the placement of a data centre in a location with negative environmental influences is unavoidable, these influences shall be mitigated by protective constructional, technical, and/or organizational measures.

5.3.2 Natural environment

5.3.2.1 Requirements

The environmental risk analysis shall be conducted which, as a minimum, considers the following natural environment items:

- a) flooding;
- b) seismic activity and earthquakes. Requirements and recommendations of CLC/TS 50600-2-10 shall be taken into account;
- c) high wind velocities, lightning and precipitation;
- d) air contamination by natural causes (volcanic activities, etc.);
- e) proximity to coast lines;
- f) lower than sea level;
- g) special purpose flood plains;
- h) wildfires.

5.3.2.2 Recommendations

The environmental risk analysis should take into account the effects of climate change.