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Information technology - Data centre facilities and infrastructures - Part 2-10: Earthquake risk and impact analysis

Informationstechnik - Einrichtungen und Infrastrukturen von Rechenzentren - Teil 2-10: Analyse des Risikos und der Auswirkung von Erdbeben

Technologies de l'information - Installation et infrastructures des centres de traitement de données - Partie 2-10:

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Informationstechnik - Einrichtungen und Infrastrukturen von Rechenzentren - Teil 2-10: Analyse des Risikos und der Auswirkung von Erdbeben

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Contents Page

European foreword 4
Introduction 5
1 Scope 8
2 Normative references 8
3 Terms, definitions and abbreviations 8
3.1 Terms and definitions 8
3.2 Abbreviations 9
4 Availability Class of EN 50600-1 9
5 Overview of risk associated with seismic activity 10
5.1 Direct risk of seismic motion 10
5.1.1 Ground motion 10
5.1.2 Long-period ground motion 10
5.1.3 Ground liquefaction 10
5.2 Indirect risk initiated by seismic motion 10
5.2.1 Fire and toxic or damaging effluent 10
5.2.2 Explosion 10
5.2.3 Flooding 10
5.2.4 Utilities 10
5.2.5 Access 11
5.2.6 Transport 11
5.2.7 Security systems 12
6 Seismic activity risk assessment 12
6.1 General 12
6.2 Ground motion 12
6.3 Ground stability 13
6.4 Evaluation by Probable Maximum Loss (PML) 14
6.4.1 General 14
6.4.2 Advantages and disadvantages 15
7 Seismic activity risk mitigation 15
7.1 Direct risk of seismic motion 15
7.1.1 General 15
7.1.2 Structural mitigation using isolation base techniques 15
7.1.3 Localized mitigation 18
7.1.4 Roofs and ceiling supports 19
7.2 Indirect risk initiated by seismic motion 20
7.2.1 Fire and toxic or damaging effluent 20
7.2.2 Explosion 21
7.2.3 Flooding 21
7.2.4 Utilities 21
7.2.5 Access 22
7.2.6 Transport 22
8 Disaster planning and recovery 22

Bibliography 23

Tables

Table 1 — PGA and Seismic Intensity Scales 12
Table 2 — PGA and typical damage 12
Table 3 — P_L value and risk of liquefaction 14
Table 4 — Example of evaluation criteria of PML 14

Figures

Figure 1 — Schematic relationship between the EN 50600 series of documents 6
Figure 2 — The effect of soil liquefaction 14
Figure 3 — Structure with an isolation base 16
Figure 4 — Oil damper 16
Figure 5 — Lead damper 16
Figure 6 — Steel damper 17
Figure 7 — Laminated rubber isolator 17
Figure 8 — Laminated rubber isolator with lead plug 17
Figure 9 — Sliding bearing 18
Figure 10 — Rack isolator 18
Figure 11 — Equipment suspended from roof/ceiling slab 19
Figure 12 — Example of duct or cable management systems suspended from roof/ceiling slab 20
Figure 13 — Anti-drop measures of lightning equipment for suspended ceiling systems 20

European foreword

This document (CLC/TS 50600-2-10:2021) has been prepared by CLC/TC 215 “Electrotechnical aspects of telecommunication equipment”.

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.

This document is based on the text of ISO/IEC TR 22237-30:—[1].

Regarding the structure of the EN 50600 series, see the Introduction.

[1] Under preparation. Stage at time of publication: ISO/IEC DTS 22237 30:2020.

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 economic 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 and physical security as well as the operation of the data centre. Effective management and operational information is crucial for monitoring achievement of the defined needs and objectives.

This series 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, facility managers, ICT managers, project managers, main contractors;

2) architects, consultants, building designers and builders, system and installation designers;

3) facility and infrastructure integrators, suppliers of equipment;

4) installers, maintainers.

At the time of publication of this document, the EN 50600 series will comprise the following standards and documents:

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

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

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

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*

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

EN 50600-4-1, *Information technology — Data centre facilities and infrastructures — Part 4-1: Overview of and general requirements for key performance indicators*

EN 50600-4-2, *Information technology — Data centre facilities and infrastructures — Part 4-2: Power Usage Effectiveness*

EN 50600-4-3, *Information technology — Data centre facilities and infrastructures — Part 4-3: Renewable Energy Factor*

EN 50600-4-6, *Information technology — Data centre facilities and infrastructures — Part 4-6: Energy Reuse Factor*

EN 50600-4-7, *Information technology — Data centre facilities and infrastructures — Part 4-7: Cooling Efficiency Ratio*

CLC/TR 50600-99-1, *Information technology — Data centre facilities and infrastructures — Part 99-1: Recommended practices for energy management*

CLC/TR 50600-99-2, *Information technology — Data centre facilities and infrastructures — Part 99-2: Recommended practices for environmental sustainability*

CLC/TR 50600-99-3, *Information technology — Data centre facilities and infrastructures — Part 99-3: Guidance to the application of EN 50600 series.*

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

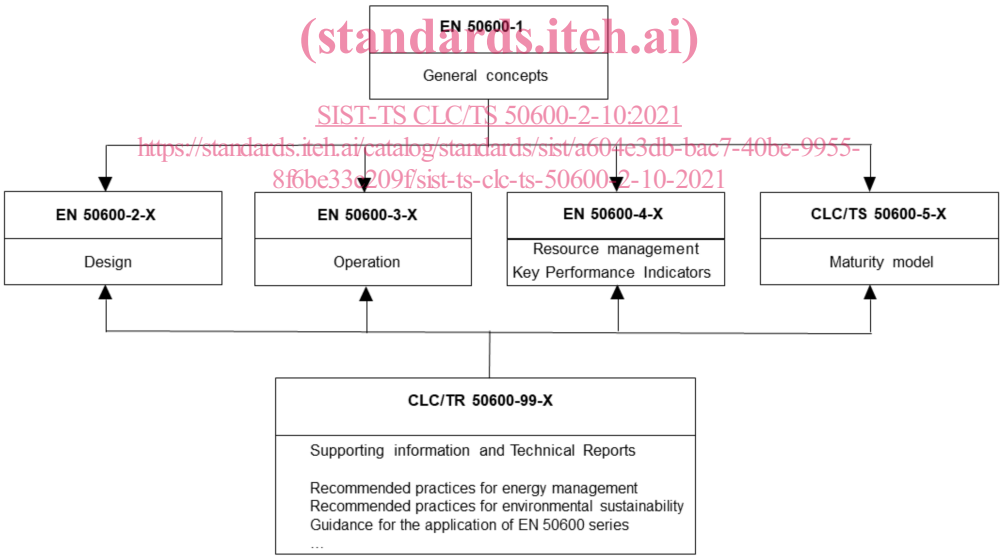

Figure 1 — Schematic relationship between the EN 50600 series of documents

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.

CLC/TS 50600-5-X documents provide a maturity model addressing the facilities, infrastructures and the information and communication technology equipment of the data centre.

Determination of the risk and scale of seismic activity should be included as part of the overall risk assessment approach according to EN 50600-1.

In addition, EN 50600-2-1 requires a geographical risk analysis which includes seismic activity and requires mitigation actions to be undertaken as necessary but does not identify the specific actions to be applied. EN 50600-2-5 addresses external environmental events but does not explicitly list earthquakes or seismic activity within that group of events (other than general vibration) or indicate the specific measures required.

As a result, this document, CLC/TS 50600-2-10, provides requirements and recommendations for the type of risk assessment to be employed concerning seismic activity and earthquakes in relation to data centres.

1 Scope

This document provides requirements and recommendations for the type of risk assessment to be employed concerning seismic activity and earthquakes in relation to data centres. In addition, it describes design concepts that can be employed as mitigation actions within the construction, and other elements of design, of data centres.

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 50600 (series), *Information technology — Data centre facilities and infrastructures*

3 Terms, definitions and abbreviations

3.1 Terms and definitions

For the purposes of this document, the terms and definitions in the EN 50600 series 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 https://www.iso.org/obp

3.1.1
aseismic performance
resistance to seismic activity of a specified scale

3.1.2
base isolation building
structure that absorbs the energy of earthquakes by installing a base isolation layer composed of isolators and dampers between the ground and the building

3.1.3
information and communication technology equipment
ICT equipment
information technology (IT) and network telecommunications (NT) equipment providing data storage, processing and transport services

Note 1 to entry: Representing the “critical load” of the data centre.

[SOURCE: CLC/TR 50600-99-1:2020, 3.1.16]

3.1.4
passive damper
structure that absorbs the energy of earthquakes with dampers, etc., by installing energy absorption members such as dampers in main structures

3.1.5
Peak Ground Acceleration
PGA
maximum ground acceleration that occurred during earthquake shaking at a location

Note 1 to entry: PGA is equal to the amplitude of the largest absolute acceleration recorded on an accelerogram at a site during a particular earthquake.

Note 2 to entry: Earthquake shaking generally occurs in all three directions. Therefore, PGA is often split into the horizontal and vertical components. Horizontal PGAs are generally larger than those in the vertical direction but this is not always true, especially close to large earthquakes.

Note 3 to entry: The design basis earthquake ground motion (DBEGM) is often defined in terms of PGA.

3.1.6
Probable Maximum Loss
PML
ratio (expressed as a percentage) of the restoration cost to the re-procurement cost taking into account the degree of earthquake risks, the stability of ground, the earthquake resistance of the building, and the earthquake resistance of the facilities

3.1.7
re-procurement cost
total cost required to reconstruct the assets damaged at the time of evaluation

3.1.8
restoration cost
cost required to recover the damage caused by seismic activity (earthquake)

3.2 Abbreviations

For the purposes of this document, the following abbreviations apply in addition to those of the EN 50600 series.

ffs	for further study
PGA	Peak Ground Acceleration
PML	Probable Maximum Loss
SIS	Seismic Intensity Scale

4 Availability Class of EN 50600-1

EN 50600-1 defines four Classes of overall availability of the set of facilities and infrastructures of the data centre, described as Class 1 to 4, which are intended to provide increasing levels of availability.

The desired Availability Class is supported by design solutions for

a) power supply and distribution systems (EN 50600-2-2),

b) environmental control systems (EN 50600-2-3),

c) telecommunications cabling infrastructure (EN 50600-2-4).

If the data centre is to be located in a region of seismic activity then mitigation actions are necessary in order to maintain the desired Availability Class (but not further define it).

The intention of these actions is to provide the data centre of a desired Availability Class with aseismic performance.