
**Information technology — Data centre
facilities and infrastructures —**

**Part 2:
Building construction**

*Technologie de l'information — Installation et infrastructures de
centres de traitement de données —*

Partie 2: Construction des bâtiments

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ISO/IEC TS 22237-2:2018

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Published in Switzerland

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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 39, *Sustainability for and by Information Technology*.

A list of all parts in the ISO/IEC TS 22237 series can be found on the ISO website.

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 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 carbon 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 and physical security. Effective management and operational information is required to monitor achievement of the defined needs and objectives.

The ISO/IEC TS 22237 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) consultants, architects, 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 ISO/IEC TS 22237 series will comprise the following documents:

ISO/IEC TS 22237-1: *Information technology — Data centre facilities and infrastructures — Part 1: General concepts;*

ISO/IEC TS 22237-2: *Information technology — Data centre facilities and infrastructures — Part 2: Building construction;*

ISO/IEC TS 22237-3: *Information technology — Data centre facilities and infrastructures — Part 3: Power distribution;*

ISO/IEC TS 22237-4: *Information technology — Data centre facilities and infrastructures — Part 4: Environmental control;*

ISO/IEC TS 22237-5: *Information technology — Data centre facilities and infrastructures — Part 5: Telecommunications cabling infrastructure;*

ISO/IEC TS 22237-6: *Information technology — Data centre facilities and infrastructures — Part 6: Security systems;*

ISO/IEC TS 22237-7: *Information technology — Data centre facilities and infrastructures — Part 7: Management and operational information.*

The inter-relationship of the specifications within the ISO/IEC TS 22237 series is shown in [Figure 1](#).

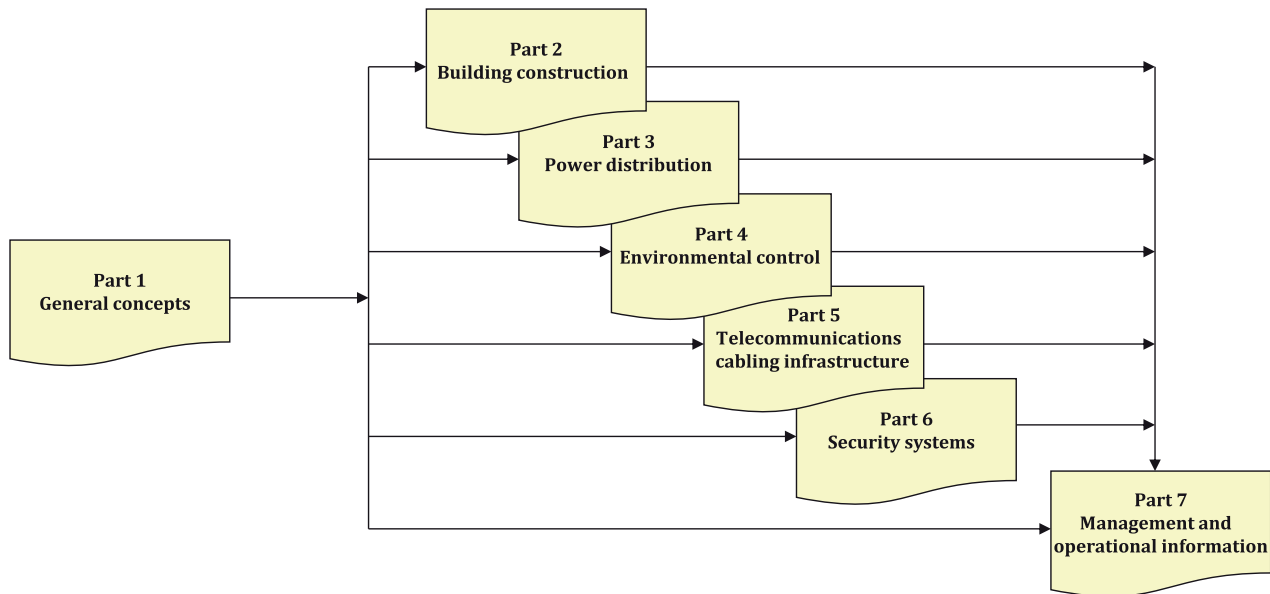


Figure 1 — Schematic relationship between the ISO/IEC TS 22237 series of documents

ISO/IEC TS 22237-2 to ISO/IEC TS 22237-6 specify requirements and recommendations for particular facilities and infrastructures to support the relevant classification for “availability”, “physical security” and “energy efficiency enablement” selected from ISO/IEC TS 22237-1.

This document addresses the building design of data centres; it addresses security issues from a constructional point of view, whereas ISO/IEC TS 22237-6 specifies the pertinent security system requirements of those facilities and infrastructures (in accordance with the requirements of ISO/IEC TS 22237-1).

ISO/IEC TS 22237-7 addresses the operational and management information (in accordance with the requirements of ISO/IEC TS 22237-1).

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

The ISO/IEC TS 22237 series does not address the selection of information technology and network telecommunications equipment, software and associated configuration issues.

Information technology — Data centre facilities and infrastructures —

Part 2: Building construction

1 Scope

This document addresses the construction of buildings and other structures which provide accommodation for data centres based upon the criteria and classification for “physical security” within ISO/IEC TS 22237-1 in support of availability.

This document specifies requirements and recommendations for the following:

- a) location and site selection;
- b) building construction;
- c) building configuration;
- d) fire protection;
- e) 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 may 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.

ISO 14520-1, *Gaseous fire-extinguishing systems — Physical properties and system design — Part 1: General requirements*

ISO/IEC 14763-2, *Information technology — Implementation and operation of customer premises cabling — Part 2: Planning and installation*

ISO/IEC TS 22237-1, *Information technology — Data centre facilities and infrastructures — Part 1: General concepts*

ISO/IEC TS 22237-3, *Information technology — Data centre facilities and infrastructures — Part 3: Power distribution*

ISO/IEC TS 22237-4, *Information technology — Data centre facilities and infrastructures — Part 4: Environmental control*

ISO/IEC TS 22237-5, *Information technology — Data centre facilities and infrastructures — Part 5: Telecommunications cabling infrastructure*

ISO/IEC TS 22237-6, *Information technology — Data centre facilities and infrastructures — Part 6: Security systems*

ISO/IEC 30129, *Information technology — Telecommunications bonding networks for buildings and other structures*

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

EN 12825:2001, *Raised access floors*

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the terms and definitions in ISO/IEC TS 22237-1 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 <https://www.iso.org/obp>

3.1.1

access floor

system consisting of completely removable and interchangeable floor panels that are supported on adjustable pedestals connected by stringers to allow the area beneath the floor to be used by building services

3.1.2

access provider

operator of any facility that is used to convey telecommunications signals to and from a customer premises

3.1.3

building entrance facility

facility that provides all necessary mechanical and electrical services for the entry of telecommunications cables into a building and which may allow for transition from external to internal cable

[SOURCE: ISO/IEC TS 22237-1:2018, 3.1.2]

3.1.4

modular construction

method which uses standardized prefabricated construction elements with the possibility to add extra elements when more space is required

3.1.5

pathway

defined route for different media between identified points

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

3.1.6

plenum

compartment or chamber to which one or more air ducts are connected and that forms part of the air distribution system

3.1.7**room in room**

construction method to have a physically independent chamber (walls and ceiling) in a new or existing building

Note 1 to entry: Room in room can provide high level fire rating, water tightness, smoke tightness and intrusion protection required for IT environments.

3.2 Abbreviated terms

For the purposes of this document the following abbreviated terms apply:

DC Direct Current

HVAC Heating, Ventilation, Air Conditioning

IT Information Technology

4 Conformance

For a data centre to conform to this document:

- a) its location shall have been selected following a site assessment as required in [Clause 5](#);
- b) it shall comply with the site requirements of [Clause 6](#);
- c) it shall meet the building construction requirements of [Clause 7](#) where the data centre spaces are within buildings;
- d) it shall meet the building configuration requirements detailed in [Clause 8](#);
- e) it shall meet the fire protection requirements of [Clause 9](#);
- f) it shall meet the quality construction measures of [Clause 10](#);
- g) local regulations, including safety, shall be met.

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 an existing site. The location shall be assessed against the following criteria:

- a) geographical location (see [5.2](#));
- b) natural environment (see [5.3](#));
- c) adjacencies (see [5.4](#));
- d) infrastructural factors (see [5.5](#));
- e) budgetary factors such as site costs and cost to bring utilities to the site;
- f) local regulation issues.

Personnel factors (operational personnel, security personnel) are not covered in this clause.

5.1.2 Recommendations

None.

5.2 Geographical location

5.2.1 Requirements

The elevation above sea level can have a direct influence on the performance of technical equipment and 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) 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 biogases).

5.3 Natural environment

5.3.1 Requirements

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

- a) flooding;
- b) active seismic zones;
- c) high wind velocities;
- d) air contamination by natural causes (volcanic activities, etc.);
- e) near to coast lines;
- f) lower than sea level;
- g) on special purpose flood plains.

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 Recommendations

None.

5.4 Adjacencies

5.4.1 Requirements

A risk analysis shall be conducted which, as a minimum, considers adjacency to the following items:

- a) facilities storing, processing or in other ways dealing with nuclear, explosive, flammable or toxic substances or other hazardous materials;
- b) transportation arteries like waterways, highways, railway tracks, flight paths;