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Information technology — Data centre facilities and infrastructures —

Part 4: Environmental control

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

Partie 4: Contrôle environnemental

Reference number
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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.

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 or www.iec.ch/members_experts/refdocs).

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) or the IEC list of patent declarations received (see patents.iec.ch).

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

For an explanation of 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 www.iso.org/iso/foreword.html. In the IEC, see www.iec.ch/understanding-standards.

This document was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 39, *Sustainability, IT & Data Centres*.

This first edition cancels and replaces the first edition (ISO/IEC TS 22237-4:2018), which has been technically revised.

The main changes are as follows:

— availability requirements have been aligned with ISO/IEC 22237-1 and ISO/IEC 22237-3;

— figures have been updated.

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

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html and www.iec.ch/national-committees.

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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 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 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; and

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

NOTE Cloud services can be provided by all data centre types mentioned.

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. Effective management and operational information are required to monitor achievement of the defined needs and objectives.

The ISO/IEC 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, operators, facility managers, ICT managers, project managers, main contractors;

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

3) suppliers of equipment; and

4) installers, maintainers.

At the time of publication of this document, the ISO/IEC 22237 series comprises the following documents:

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

— ISO/IEC 22237-4 (this document), *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*;

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— 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 22237 series is shown in Figure 1.

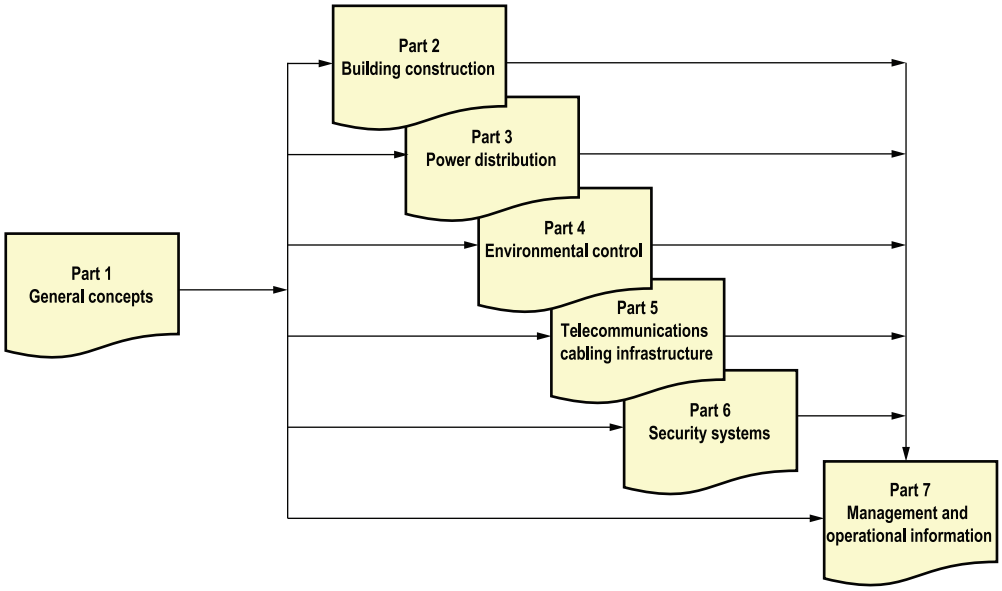


Figure 1 — Schematic relationship between the ISO/IEC 22237 series of documents

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 22237-1.

This document, ISO/IEC 22237-4, addresses the environmental control facilities and infrastructure within data centres together with the interfaces for monitoring the performance of those facilities and infrastructures in line with ISO/IEC TS 22237-7 (in accordance with the requirements of ISO/IEC 22237-1).

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

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

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

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Information technology — Data centre facilities and infrastructures —

Part 4: Environmental control

1 Scope

This document addresses environmental control within data centres based upon the criteria and classifications for "availability", "security" and "energy efficiency enablement" within ISO/IEC 22237-1.

This document specifies requirements and recommendations for the following:

a) temperature control;

b) fluid movement control;

c) relative humidity control;

d) particulate control;

e) vibration;

f) physical security of environmental control systems.

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 14644-8, *Cleanrooms and associated controlled environments — Part 8: Classification of air cleanliness by chemical concentration (ACC)*

ISO 16890-1, *Air filters for general ventilation — Part 1: Technical specifications, requirements and classification system based upon particulate matter efficiency (ePM)*

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

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

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

IEC 61439-1, *Low-voltage switchgear and controlgear assemblies — Part 1: General rules*

IEC 62040-3, *Uninterruptible power systems (UPS) — Part 3: Method of specifying the performance and test requirements*

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3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology 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/

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

Note 1 to entry: Also known as raised floor.

[SOURCE: ISO/IEC TS 22237-2:2018, 3.1.1 – modified: added note 1 to entry]

3.1.2
comfort environmental control
control which produces an environment which is appropriate for the effective performance of personnel in a given space

3.1.3
dew point
temperature at which the water vapour in a gas begins to deposit as a liquid or ice, under standardized conditions

3.1.4
direct fresh air cooling
cooling system that uses the external air that can be filtered to cool the IT equipment in the data centre

3.1.5
diesel rotary uninterruptible power system
DRUPS
system where the output waveform is produced by a rotating machine that is mechanically connected to a flywheel stored energy source, and the flywheel stored energy source is coupled to a backup engine with an electro-magnetic clutch

3.1.6
inlet air temperature
temperature of the (cold) air entering the rack or IT equipment

3.1.7
relative humidity
ratio, expressed as a percentage, of the vapour pressure of water vapour in moist air to the saturation vapour pressure with respect to water or ice at the same temperature

[SOURCE: IEC 60050-705:1995, 705-05-09]

3.1.8
return air temperature
temperature of the (warm) air re-entering the environmental control system, e.g. the air handling unit

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3.1.9
rotary uninterruptible power system
rotary UPS
system where the output waveform is produced by a rotating machine, using either batteries or flywheel as stored energy source

3.1.10
static uninterruptible power system
static UPS
system where the output waveform is produced by electronic circuits, using either batteries or flywheel as stored energy source

3.1.11
supply air temperature
temperature of the (cold) air leaving the environmental control system e.g. the air handling unit

3.1.12
ventilation
supply of air motion in a space by circulation or by moving air through the space

Note 1 to entry: Ventilation can be produced by any combination of natural or mechanical supply and exhaust.

Note 2 to entry: Such systems can include partial treatment such as heating, *relative humidity* (3.1.7) control, filtering or purification, and, in some cases, evaporative cooling.

3.2 Abbreviated terms

For the purposes of this document, the abbreviated terms given in ISO/IEC 22237-1 and the following apply.

AHU	air handling unit
DX	direct expansion cooling unit
IT	information technology
ICT	information and communication technology

4 Conformance

For a data centre to conform to this document:

a) it shall feature an environmental control solution that meets the requirements of Clauses 5 and 6;

b) it shall feature an approach to physical security in relation to the environmental control solution that meets the requirements of Clause 7;

c) it shall feature an energy efficiency enablement solution that meets the requirements of the relevant Granularity Level of Clause 8;

d) local regulations, including safety, shall be met.

The required Class of the Environmental Control system of a data centre is based on the required Availability Class of the data centre.

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