

# INTERNATIONAL STANDARD

## NORME INTERNATIONALE



**Mechanical structures for electrical and electronic equipment – Aisle  
containment for it cabinets –  
Part 1: Dimensions and mechanical requirements**

**Structures mécaniques pour équipements électriques et électroniques –  
Confinement d'allées pour les baies informatiques –  
Partie 1: Dimensions et exigences mécaniques**



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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

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ELECTRICAL AND ELECTRONIC EQUIPMENT –  
AISLE CONTAINMENT FOR IT CABINETS –****Part 1: Dimensions and mechanical requirements****FOREWORD**

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International Standard IEC 62966-1 has been prepared by subcommittee 48D: Mechanical structures for electrical and electronic equipment, of IEC technical committee 48: Electrical connectors and mechanical structures for electrical and electronic equipment.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
48D/691/FDIS	48D/698/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 62966 series, published under the general title *Mechanical structures for electrical and electronic equipment – Aisle containment for IT cabinets*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific document. At this date, the document will be

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## INTRODUCTION

Cabinets of the IEC 60297 and IEC 60917 standard series are used as enclosures of electrical and electric equipment in many different fields of application. A wide field of application is represented by enclosures equipped with electronic information technology (IT) equipment. They are frequently set up in large numbers in server rooms and data centres. During their operation, the electronic equipment installed generates a considerable amount of heat that must be dissipated from the equipment by means of cooling air. Precise adjustment of the supply air temperature and a sufficient cooling air flow are indispensable prerequisites for the fail-safe operation of equipment in information technology.

Currently, it is common use in data centres and server rooms to set up cabinets in rows. The server cabinets along the rows are usually arranged in such a way that surfaces with cold supply air inlets face each other across an aisle, and surfaces with hot exhaust air outlets also face each other across an aisle. This row configuration is generally known as hot aisle/cold aisle configuration. Moreover, air is supplied and discharged exclusively via the front and rear panels of the server cabinets, which are frequently perforated doors. It is assumed that inside the IT equipment, the cooling air is moved in horizontal direction, taking it in at the front and discharging it at the rear.

The required cooling air is provided by room air or row air conditioners. Warm exhaust air is moved by fans usually through a fluid/air heat exchanger that cools it.

In the arrangement described, considerable quantities of cooling air pass by the IT equipment, especially servers, which it is expected to cool, without having any cooling effect. Concurrently, recirculation within and outside the cabinet causes hot exhaust air to be absorbed as cooling air, which results in faulty operation. In order to minimize such recirculation, more cooling air than required needs to be supplied, this adversely affects the energy efficiency of the data centre.

The separation of air flows into enclosed air volumes consisting of either cold supply air or hot exhaust air precludes recirculation to the largest possible extent (see Figure 1). Such separation reduces the required cooling air flow because re-circulations are ruled out. Air flow separation can reduce power consumption by the fans in the cooling units once fan speed control fans are used.

Separation of the cold supply air from the hot exhaust air is achieved by covering the aisles of the same temperature level with top cover elements, adding doors or similar design elements to the end of the aisles, and all openings inside the cabinets at the front 482,6mm (19") rails shall be closed.

The installations of aisle containments in data centres and IT rooms shall not restrict the air intake demands for the correct usage and operation of servers or other IT equipment. Especially the required supply air temperature and the cooling air flow rate needed shall not be affected by the aisle containment. This can improve the energy efficiency as most of the cooling infrastructure has a higher efficiency with a higher difference between the air intake and the air exhaust temperature.

The temperature difference between supply and exhaust air rises due to the reduced cooling air volume. As the supply air temperature of the cooling air is usually specified, thus being kept constant, an increase in the temperature difference results in an increase of the temperature of the warm exhaust air. This has a positive impact on the temperature difference to the temperature of ambient air, as the energy efficiency of the cooling of the building and infrastructure is improved by the raised temperature gradient.

The period during which system cooling is required to be supported by a mechanical cooling machine is reduced. Both the reduction of the cooling air flow and the reduction of times of mechanical cooling lead to considerable reduction in the consumption of electrical power. This effects significant savings in operating costs for data centres and server rooms. This results in

an environmentally-friendly use of resources, thereby relieving stress on the environment and slowing down global warming by reduced CO<sub>2</sub> emission.

Part 1 of the standard series defines geometric dimensions and mechanical properties ensuring undisturbed, energy-efficient and user-friendly operation of the data centre.

Part 2 defines characteristics and requirements of air separation, especially the air leakage rate, and determines the air leakage rate. Besides, operational parameters are determined, especially temperatures at which IT equipment in aisle containment are operated.

Part 3 deals with aspects of safely operating IT equipment in aisle containment, discussing special fire-protection and fire-fighting issues. It also provides required specifications of the doors for access to the aisle containment and possible access control.

In the past years, widely varying forms of aisle containment have been installed in server rooms and data centres. This document is intended to provide confidence by reflecting and structuring the currently most widely used solutions and catering for the energy-efficient operation of IT equipment. This document is also expected to solve probable uncertainties and problems concerning the containment technology

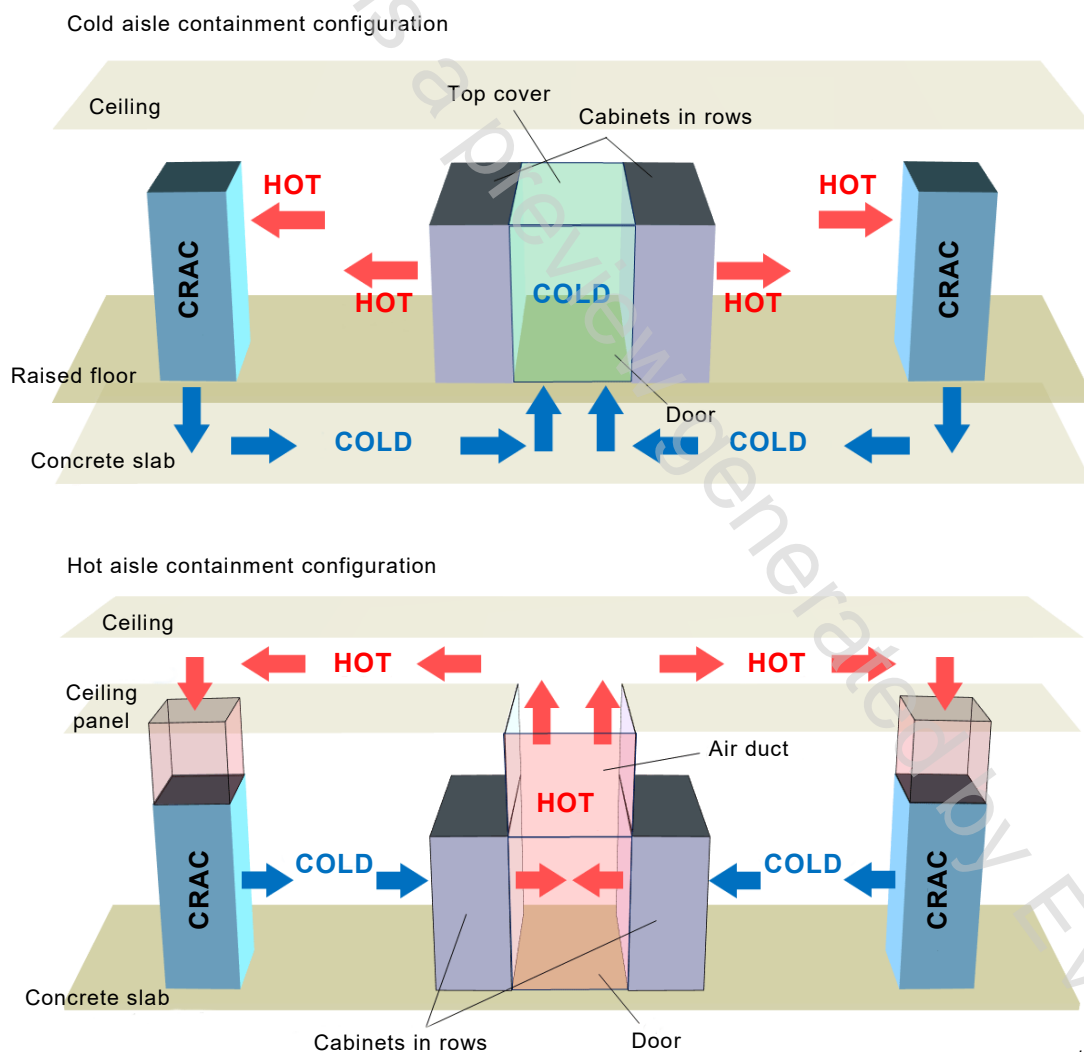


Figure 1 – Examples of an aisle containment

# MECHANICAL STRUCTURES FOR ELECTRICAL AND ELECTRONIC EQUIPMENT – AISLE CONTAINMENT FOR IT CABINETS –

## Part 1: Dimensions and mechanical requirements

### 1 Scope

This part of IEC 62966 defines the dimensions and mechanical requirements of aisle containment for information technology (IT) cabinets. The cabinets concerned are dealt with in the standard series IEC 60297 and IEC 60917. The objective of this document is to stipulate properties and requirements of aisle containment ensuring cost effective installation, energy-efficient and user-friendly operation of IT equipment in data centres and server rooms.

### 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.

IEC 61587-1, *Mechanical structures for electronic equipment – Tests for IEC 60917 and IEC 60297 series – Part 1: Environmental requirements, test set-up and safety aspects for cabinets, racks, subracks and chassis under indoor condition use and transportation*

IEC 61587-2, *Mechanical structures for electronic equipment – Tests for IEC 60917 and 60297 – Part 2: Seismic tests for cabinets and racks*

IEC 62966-2: *Mechanical structures for electrical and electronic equipment – Aisle containment for IT cabinets – Part 2: Details of air flow, air separation and air cooling requirements* (to be published)

### 3 Terms and definitions

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

##### aisle containment

physical containment mainly formed of IT cabinets arranged in parallel rows with a centre aisle, a top cover across the aisle, doors or building structure at the ends of the aisle, and a floor

Note 1 to entry: The main purpose is the cooling air guidance to the IT equipment and the avoidance of bypass air and cooling air re-circulations.