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Mechanical structures for electrical and electronic equipment – Thermal management for cabinets in accordance with IEC 60297 and IEC 60917 series – Part 2: Method for the determination of forced air cooling

Structures mécaniques pour équipements électriques et électroniques – Gestion thermique pour les armoires conformes aux séries IEC 60297 ET IEC 60917 – Partie 2: Méthode pour la détermination du refroidissement par ventilation forcée



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**MECHANICAL STRUCTURES FOR ELECTRICAL
AND ELECTRONIC EQUIPMENT –
THERMAL MANAGEMENT FOR CABINETS IN
ACCORDANCE WITH IEC 60297 AND IEC 60917 SERIES –****Part 2: Method for the determination of forced air cooling**

FOREWORD

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

FDIS	Report on voting
48D/664/FDIS	48D/673/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 62610 series, published under the general title *Mechanical structures for electrical and electronic equipment – Thermal management for cabinets in accordance with IEC 60297 and IEC 60917 series*, 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

Power dissipation of high-end servers, telecommunication equipment and electronic controllers has been increasing rapidly. Thermal management for electronic systems has become critical to maintain performance and reliability.

For a long time natural convection air cooling was an adequate and reliable solution. Typically, the cooling air entered a system at the bottom and the heated air exited at the top. However, with increasing packaging density heat dissipation of components required “compartmentalizing” of functions within a cabinet. Individual subracks and chassis require their own individual cooling solutions often enhanced by forced air cooling devices such as fans.

In the absence of any guide, subrack and chassis designers typically solve their cooling problems in a way that is best suited for their specific application leaving the cabinet system integrator to deal with a mix of incompatible subrack and/or chassis cooling concepts.

An improper arrangement of multiple subracks and/or chassis (the equipment) in a cabinet may cause a severe imbalance of airflow within the cabinet. Two typical undesirable factors may be triggered by such an imbalanced airflow. The required airflow volume to each individual cabinet mounted equipment may be inadequate for proper cooling. The temperature of components in a cabinet mounted subrack and/or chassis may increase as the exhaust air of one equipment increases the intake air temperature of other equipment.

This document defines the basic and principal method to implement forced air cooling in electrical and electronic cabinets. This is applied for the thermal design of any electrical/electronic cabinet, as well as for their set-up in machine rooms, such as data centers using aisle containment. Cooling airflow is considered not only inside of the cabinets but also outside of the cabinets. A variable speed fan may be optional in cabinets or subracks/chassis, but is not regarded in this standard.

The intention of this document is to guide the subrack and/or chassis system designer, the cabinet integrator and also the data centre system integrator who deploys equipment cabinets in the machine room to provide for compatible forced air cooling solutions.

This document is based on the mechanical structures as defined in the IEC 60297 and IEC 60917 series of standards.

MECHANICAL STRUCTURES FOR ELECTRICAL AND ELECTRONIC EQUIPMENT – THERMAL MANAGEMENT FOR CABINETS IN ACCORDANCE WITH IEC 60297 AND IEC 60917 SERIES –

Part 2: Method for the determination of forced air cooling

1 Scope

This part of IEC 62610 provides for compatible methods of configuring forced air cooled cabinets assembled with associated subracks and/or chassis in accordance with the IEC 60297 and IEC 60917 series.

This document contains the following:

- a) thermal interfaces of subracks and/or chassis-based equipment in a cabinet, described by:
 - reference temperature,
 - preferred airflow conditions,
 - airflow volume conditions,
 - standard air;
- b) procedures for determining compatible forced airflow conditions in a cabinet by applying typical thermal interface conditions.

The drawings used are not intended to indicate product design. They are only for explanatory indications for determining forced air cooling.

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 60917-1, *Modular order for the development of mechanical structures for electronic equipment practices – Part 1: Generic standard*

3 Terms and definitions

For the purposes of this document, terms and definitions of IEC 60917-1 as well as 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 <http://www.iso.org/obp>

3.1

forced air cooling

cooling system in which the air is moved by external power