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TECHNICAL SPECIFICATION

SPÉCIFICATION TECHNIQUE

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

Structures mécaniques pour équipements électroniques – Gestion thermique pour les armoires conformes aux séries CEI 60297 et CEI 60917 – Partie 2: Guide de conception: Méthode pour la détermination de la structure de refroidissement par ventilation forcée

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Part 2: Design guide: Method for the determination of forced air-cooling structure

FOREWORD

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Technical specifications are subject to review within three years of publication to decide whether they can be transformed into International Standards.

IEC 62610-2 TS Ed.1.0, which is a technical specification, has been prepared by subcommittee 48D: Mechanical structures for electronic equipment, of IEC technical

committee 48: Electromechanical components and mechanical structures for electronic equipment.

The text of this technical specification is based on the following documents:

Enquiry draft	Report on voting
48D/459/DTS	48D/470/RVC

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

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

A list of all parts of IEC 62610 series, under the general title *Mechanical structures for 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 publication will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- transformed into an International standard,
- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

INTRODUCTION

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

For a long time convection air cooling was an adequate and reliable solution. Typically, the cooled air entered a system on the bottom and the heated air exits 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 devices such as fans.

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

An improper arrangement of multiple subracks and/or chassis (the equipment) in a cabinet may cause a severe imbalance of airflow and/or unwanted temperature rises preventing effective cooling of the cabinet installed equipment. Two typical undesirable factors may be triggered by such an imbalanced airflow and/or unwanted temperature rise(s) within a cabinet. The required airflow volume to each individual cabinet mounted equipment may fall short. The air-intake temperature of each cabinet mounted subrack and/or chassis may increase as exhaust air of one equipment may increase the air-intake temperature of another equipment. As a result, unwanted temperature rise of components may occur.

The intention of this guide is to educate the subrack and/or chassis system designer and the cabinet integrator to provide for compatible forced air cooling solutions.

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

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

Part 2: Design guide: Method for the determination of forced air-cooling structure

1 Scope and object

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

This design guide contains the following:

a) Thermal interfaces of subrack and/or chassis based equipment in a cabinet
   - 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 explanatory indications for determining forced air-cooling structure.

The terminology used complies with IEC 60917-1.

2 Thermal interfaces

2.1 Baseline thermal conditions

In order to enable reproducible and comparable values, standard air is defined at the air inlet to be used for the determination of the thermal capability and requirement parameters of products.

NOTE Standard air as defined for this purpose has a density of 1,2 kg/m^3, a relative humidity of 50 %, a temperature of 20 °C, a pressure of 1,013 × 10^5 Pa. A specified heat capacity is 1 005 J/kgK at these conditions. These values are aligned with the fan industry specifications, common test practices and electronic industry expectations.

2.2 Reference temperature

The thermal operating temperature of subrack and chassis in the cabinet should be defined at the air inlet, and this temperature is called reference temperature in this technical specification.

Reference temperature is defined as the temperature of an objective ambient air of the equipment in the cabinet which is a starting point for a rise in internal temperatures of the equipment, and, at the same time, influences internal temperatures of it.

At one typical equipment which consists of a subrack and a forced air-cooling device, temperatures of internal air and inside components of the subrack are determined as certain