SLOVENSKI STANDARD
SIST EN 62610-5:2016

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Mehanske konstrukcije za električno in elektronsko opremo - Uravnavanje toplote v omaricah v skladu s serijama IEC 60297 in IEC 60917 - 5. del: Ocenjevanje hladilnih lastnosti notranjih omaric (IEC 62610-5:2016)

Mechanical structures for electrical and electronic equipment - Thermal management for cabinets in accordance with IEC 60297 and IEC 60917 series - Part 5: Cooling performance evaluation for indoor cabinets (IEC 62610-5:2016)

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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 5: Cooling performance evaluation for indoor cabinets (IEC 62610-5:2016)

Structures mécaniques pour équipements électriques et électroniques - Gestion thermique pour les armoires conformes aux séries IEC 60297 et IEC 60917 - Partie 5: Évaluation des performances de refroidissement pour les baies intérieures
(IEC 62610-5:2016)

Mechanische Bauweisen für elektronische Einrichtungen - Wärmemanagement für Schränke nach den Reihen IEC 60297 und IEC 60917 - Teil 5: Bewertung der Kühlleistung für Innenraumschränke
(IEC 62610-5:2016)

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European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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European foreword

The text of document 48D/591/CDV, future edition 1 of IEC 62610-5, prepared by SC 48D “Mechanical structures for electrical and electronic equipment” of IEC/TC 48 “Electrical connectors and mechanical structures for electrical and electronic equipment" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 62610-5:2016.

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• latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2017-02-25
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The text of the International Standard IEC 62610-5:2016 was approved by CENELEC as a European Standard without any modification.

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colour inside

Mechanical structures for electrical and electronic equipment – Thermal management for cabinets in accordance with IEC 60297 and IEC 60917 series – Part 5: Cooling performance evaluation for indoor cabinets

Structures mécaniques pour équipements électriques et électroniques – Gestion thermique pour les armoires conformes aux séries IEC 60297 et IEC 60917 – Partie 5: Évaluation des performances de refroidissement pour les baies intérieures

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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 5: Cooling performance evaluation for indoor cabinets

FOREWORD

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International Standard IEC 62610-5 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 standard is based on the following documents:

CDV	Report on voting
48D/591/CDV	48D/604/RVC

Full information on the voting for the approval of this standard 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 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.

Future standards in this series will carry the new general title as cited above. Titles of existing standards in this series will be updated at the time of the next edition.

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

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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INTRODUCTION

Indoor cabinets containing electronic equipment in subrack(s) and/ or chassis provide cooling by several different means, depending on the heat load of the equipment in the cabinet. In most cases air convection is used for cooling. The cabinets can be sealed or non-sealed, and may be equipped with fans for forced air cooling or rely on natural convention cooling without fans. In addition the subrack(s) or chassis may contain their own fans or rely on natural convention. Air convection systems are used to cool low to medium heat load applications. Indoor cabinets containing subrack(s) and/ or chassis assembled with high heat load electronic equipment typically are cooled by air to air heat exchangers or water supplied heat exchangers, and are not considered in this standard.

Sealed cabinets are used for systems operated in an industrial atmosphere, to protect the equipment against harsh environments, such as dust or water (IP), or provisions for EMC or acoustic noise. Non-sealed cabinets are used in offices, laboratories or data centres, where the environment is controlled.

The cooling performance of an electronic cabinet depends on the type of the cabinet, either sealed or non-sealed, with or without air moving devices, ventilated or re-circulated, and also, on the heat loads and the additional cooling systems (if any) of the equipment inside the cabinet.

Therefore, it is difficult to determine properly the cooling capabilities of empty electronic cabinets for various applications. This standard introduces a simplified method for an overall cooling performance evaluation for empty indoor cabinets in accordance with IEC 60917 or IEC 60297 series.

The purpose of this standard is to classify the cooling methods of empty indoor cabinets, to simplify the thermal hydraulic formulae for the evaluation and classification of cabinet cooling performances, and to exemplify the cooling performances for representative cabinet sizes based on IEC 60917 or IEC 60297.

This enables the users to select the appropriate cabinet cooling solutions for their applications.

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

Part 5: Cooling performance evaluation for indoor cabinets

1 Scope

This part of IEC 62610 specifies a method for evaluating the cooling capacity mainly for air convection cooling of empty cabinets in accordance with IEC 60297 and IEC 60917 series.

2 Normative references

Void.

3 Terms and definitions

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

3.1
ventilation
movement of the air inside a cabinet, causing replacement of the inside air by the cabinet external ambient air

3.2
buoyancy
force of air in the opposite direction of gravity that is produced by the difference in density due to the temperature differences between the air inside and external to the cabinet

3.3
natural ventilation
air movement produced by buoyancy

3.4
forced air cooling
forced ventilation
ventilation by air moving devices

3.5
natural convection cooling
cooling by natural air convection and radiation

3.6
air moving device
device creating air movement, e.g. fans, blowers, and other forced air movement equipment

3.7
sealed cabinet, without air moving devices
cabinet not provided with ventilation holes, not equipped with air moving devices, where the heat is transferred to the external environment by natural convection and radiation from the external surfaces of the cabinet

Note 1 to entry: The internal air temperature gradually increases from the bottom to the top of the cabinet.

3.8
sealed cabinet, with air moving devices
cabinet not provided with ventilation holes, equipped with air moving devices for re-circulating internal air, where the heat is transferred from the surface of the cabinet towards the outside of the cabinet both by convection (forced inside, natural outside) and by radiation

Note 1 to entry: A sealed cabinet without air moving devices which contains subracks or chassis systems with air moving devices may be equivalent to a sealed cabinet with air moving devices.

Note 2 to entry: The cooling performance of this type of cabinet is equal to that of "the sealed cabinet, without air moving devices" because the heat transfer mechanism to the external environment is identical, however the internal air temperature is equalized.

3.9
non-sealed cabinet, without air moving devices
cabinet where the heat is transferred by natural convection from the provided ventilation holes and, in addition, the heat is transferred to the external environment by natural convection and radiation from the external surfaces of the cabinet

Note 1 to entry: The source of the natural ventilation airflow is only by buoyancy of the cabinet internal air, even if there are some subracks or chassis systems with air moving devices, except if the air moving devices airflow goes directly outside of the cabinet.

3.10
non-sealed cabinet, with air moving devices
cabinet equipped with air moving devices and ventilation holes

Note 1 to entry: Two cooling modes, re-circulation and forced ventilation, are utilized for this type of cabinet, depending on the location of the air moving devices.

3.11
air moving devices on the subrack <re-circulation>
cabinet equipped with subracks and/or chassis with air moving devices

Note 1 to entry: The air inside the cabinet is re-circulated by subrack or chassis mounted fans, but is not ventilated by the fans.

3.12
air moving devices on a cabinet <forced ventilation>
cabinet equipped with air moving devices on the top cover, bottom cover or the rear cover of the cabinet, it does not matter if the fans are mounted internal or external to the cabinet

Note 1 to entry: The air moving devices force the air to exit the cabinet through ventilation holes. If the cabinet mounted air moving devices airflow is larger than the combined airflow of the cabinet mounted subrack and/or chassis systems the temperature rise inside the cabinet may be zero.

Note 2 to entry: If the cabinet mounted air moving devices airflow is smaller than the combined airflow of the cabinet mounted subrack and/or chassis systems, this will cause cabinet internal air re-circulation. The maximum cabinet internal air temperature will be equal to the maximum cabinet mounted subrack and/or chassis system air exit temperature.

3.13
simplified cooling performance evaluation
method to estimate the heat load of a cabinet based upon the chosen cooling mechanism, the cabinet internal temperature limit, typical ambient temperature / humidity, and the overall cabinet size chosen for the application

Note 1 to entry: The criteria definition of conditions for the simplified cooling performance are shown in Clause 5.

Note 2 to entry: It is assumed that the cabinets are used in an standalone application. If cabinets are arranged side-by-side, placed along a building wall or back to back the cooling performance may be reduced due to loss of heat transfer surface area.