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REDLINE VERSION

colour inside

GROUP SAFETY PUBLICATION

Safety requirements for electrical equipment for measurement, control, and laboratory use –
Part 2-012: Particular requirements for climatic and environmental testing and other temperature conditioning equipment

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

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CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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SAFETY REQUIREMENTS FOR ELECTRICAL EQUIPMENT FOR MEASUREMENT, CONTROL, AND LABORATORY USE –

Part 2-012: Particular requirements for climatic and environmental testing and other temperature conditioning equipment

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
6) All users should ensure that they have the latest edition of this publication.
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8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
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DISCLAIMER
This Redline version is not an official Standard and is intended to provide the user with an indication of what changes have been made to the previous version. Only the IEC International Standard provided in this package is to be considered the official Standard.

This Redline version provides you with a quick and easy way to compare all the changes between this standard and its previous edition. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

International Standard IEC 61010-2-012 has been prepared by IEC technical committee 66: Safety of measuring, control and laboratory equipment.

It has the status of a group safety publication in accordance with IEC Guide 104.

This second edition cancels and replaces the first edition published in 2016. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) alignment with changes introduced by Amendment 1 of IEC 61010-1:2010;
b) changes related to the use of small capitals for defined terms only;
c) clarifications for cooling tests in 4.4.2.10;
d) requirements for overtemperature protection in 10.101, including deletion of the second part of the sentence in item b), and the deletion of item c);
e) changes pertaining to the accurate employment of terms "temperature", "operating temperature", "working temperature", "application temperature", "room temperature" and "ambient temperature" in 3.5.104, 3.5.105, 4.3.1, 4.3.2, 5.4.2, 8.2.1, 8.2.2, 11.7.2.101.2, 11.7.2.101.3, 13.2.102, 14.102, 15.101, 15.102, 15.103, Introduction and many other locations. For the purpose of clarification, the definition of 3.5.114, CONTROLLED TEMPERATURE, is added.

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

FDIS	Report on voting
66/687/FDIS	66/688/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 of the IEC 61010 series, published under the general title, *Safety requirements for electrical equipment for measurement, control, and laboratory use*, can be found on the IEC website.

IEC 61010-2-012 is to be used in conjunction with the latest edition of IEC 61010-1. It was established on the basis of the third edition (2010) and its Amendment 1 (2016), hereinafter referred to as Part 1.

This Part 2-012 supplements or modifies the corresponding clauses in IEC 61010-1 so as to convert that publication into the IEC standard: *Particular requirements for climatic and environmental testing and other temperature conditioning equipment.*

Where a particular subclause of Part 1 is not mentioned in this Part 2-012, that subclause applies as far as is reasonable. Where this Part 2-012 states "addition", "modification", "replacement", or "deletion", the relevant requirement, test specification, or note in Part 1 should be adapted accordingly.

In this standard:

1) the following print types are used:
   – requirements and definitions: in roman type;
   – NOTES: in smaller roman type;

- *conformity and tests: in italic type;*
- terms used throughout this standard which have been defined in Clause 3: SMALL ROMAN CAPITALS.

2) subclauses, figures, tables and notes which are additional to those in Part 1 are numbered starting from 101. Additional annexes are lettered starting from AA.

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

- reconfirmed,
- withdrawn,
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- amended.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this standard using a colour printer.

INTRODUCTION

This Part 2-012, ~~in conjunction~~ along with Part 2-010 and Part 2-011, taken together, address the specific HAZARDS associated with the heating and cooling of materials by equipment and are ~~segregated~~ organized as follows:

IEC 61010-2-010	Specifically addresses the HAZARDS associated with equipment incorporating heating systems.
IEC 61010-2-011	Specifically addresses the HAZARDS associated with equipment incorporating REFRIGERATING SYSTEMS.
IEC 61010-2-012	Specifically addresses the HAZARDS associated with equipment incorporating both heating and REFRIGERATING SYSTEMS that interact with each other such that the combined heating and ~~cooling~~ REFRIGERATING SYSTEM yield additional or more severe HAZARDS for the two systems than if treated separately. It also addresses the HAZARDS associated with the treatment of materials by other factors like irradiation, excessive humidity, CO_2 and MECHANICAL MOVEMENT, etc.

Guidance for the application of the appropriate Part 2 standard(s)

When the equipment includes only a material heating system, and no REFRIGERATING SYSTEM or other environmental factors apply, then Part 2-010 applies without needing Part 2-011 or Part 2-012. Similarly, when the equipment includes only a REFRIGERATING SYSTEM, and no material heating system or other environmental factors apply, then Part 2-011 applies without needing Part 2-010 or Part 2-012. However, when the equipment incorporates both a material heating system, and a REFRIGERATING SYSTEM or the materials being treated in the intended application introduce significant heat into the REFRIGERATING SYSTEM, a determination should be made as to whether the interaction between the two systems will generate additional or more severe HAZARDS than if the systems were evaluated separately (~~application~~ CONTROLLED TEMPERATURE, see flow chart for selection process). If the interaction of the heating and cooling functions yields no additional or more severe HAZARDS, then both Part 2-010 and Part 2-011 apply for their respective functions. Conversely, if additional or more severe HAZARDS result from the combining of the heating and cooling functions, or if the equipment incorporates additional material treatment factors, then Part 2-012 applies, but not Part 2-010 or Part 2-011.

What HAZARDS are applicable for a REFRIGERATING SYSTEM?

The typical HAZARDS for a REFRIGERATING SYSTEM (see Figure 101) consisting of a MOTOR-COMPRESSOR, a CONDENSER, an expansion device and an EVAPORATOR include but are not limited to:

– The maximum temperature of LOW-PRESSURE SIDE (return temperature) to the MOTOR-COMPRESSOR. A MOTOR-COMPRESSOR incorporates a REFRIGERANT cooled motor and it should be established that the maximum temperatures of the LOW-PRESSURE SIDE under least favourable condition do not exceed the insulation RATINGS within the motor.

– The maximum pressure of LOW-PRESSURE SIDE at the inlet to the MOTOR-COMPRESSOR. The housing of the MOTOR-COMPRESSOR is exposed to this pressure and so the design RATING of the MOTOR-COMPRESSOR housing should accommodate the worst-case pressures whilst providing the correct safety margin for a pressure vessel.

– The maximum temperature of HIGH-PRESSURE SIDE to the CONDENSER. The temperatures of the HIGH-PRESSURE SIDE under most unfavourable conditions may present a temperature HAZARD if the OPERATOR is exposed to them or if the electrical insulation is degraded.

– The maximum pressure of HIGH-PRESSURE SIDE at the outlet to the MOTOR-COMPRESSOR. The REFRIGERANT components downstream of the MOTOR-COMPRESSOR up to the expansion device are exposed to this pressure and so the design RATING of these components should accommodate the worst-case pressures whilst providing the appropriate safety margin for a pressure vessel.

– The maximum ~~application~~ CONTROLLED TEMPERATURES, namely, the SOAKED TEMPERATURE CONDITIONS,from which the heat is being extracted, may impact the maximum temperature of LOW-PRESSURE SIDE to the MOTOR-COMPRESSOR as well as present a temperature HAZARD if the OPERATOR is exposed to them or if the electrical insulation is degraded. Whether this ~~application~~ CONTROLLED TEMPERATURE is derived from an integral heating function of the device or from the heat dissipated from the material being cooled, the impact under worst case conditions should be evaluated.

– The current draw of the equipment should be established when including the worst-case running conditions of the REFRIGERATING SYSTEM including any defrost cycles that may apply.

The worst-case conditions should be determined for the equipment and will include both the least favourable NORMAL USE conditions as well as the most unfavourable testing results under SINGLE FAULT CONDITIONS.

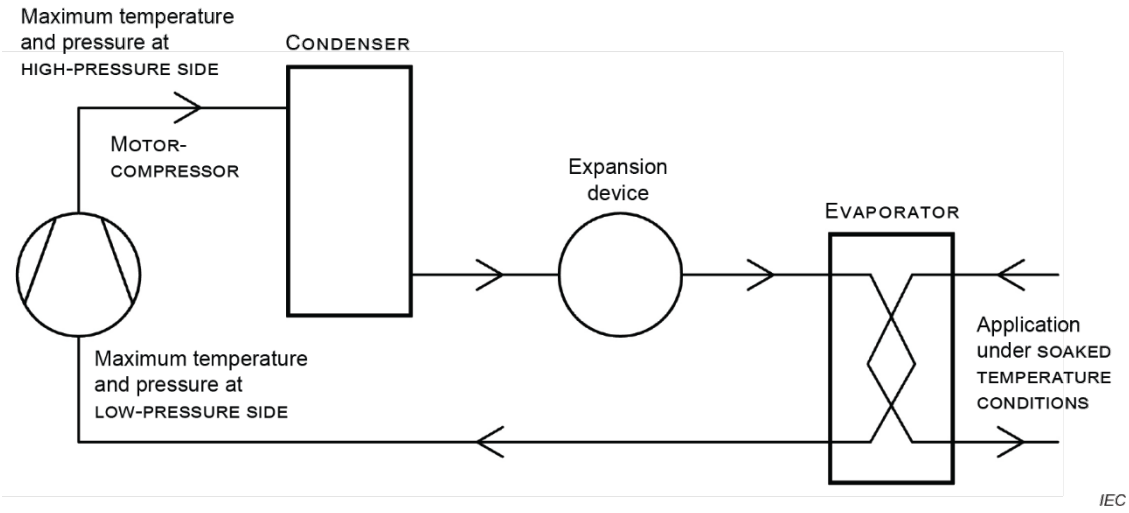

Figure 101 – Schema of a REFRIGERATING SYSTEM incorporating a CONDENSER

The selection process is illustrated in the following flow chart (see Figure 102).

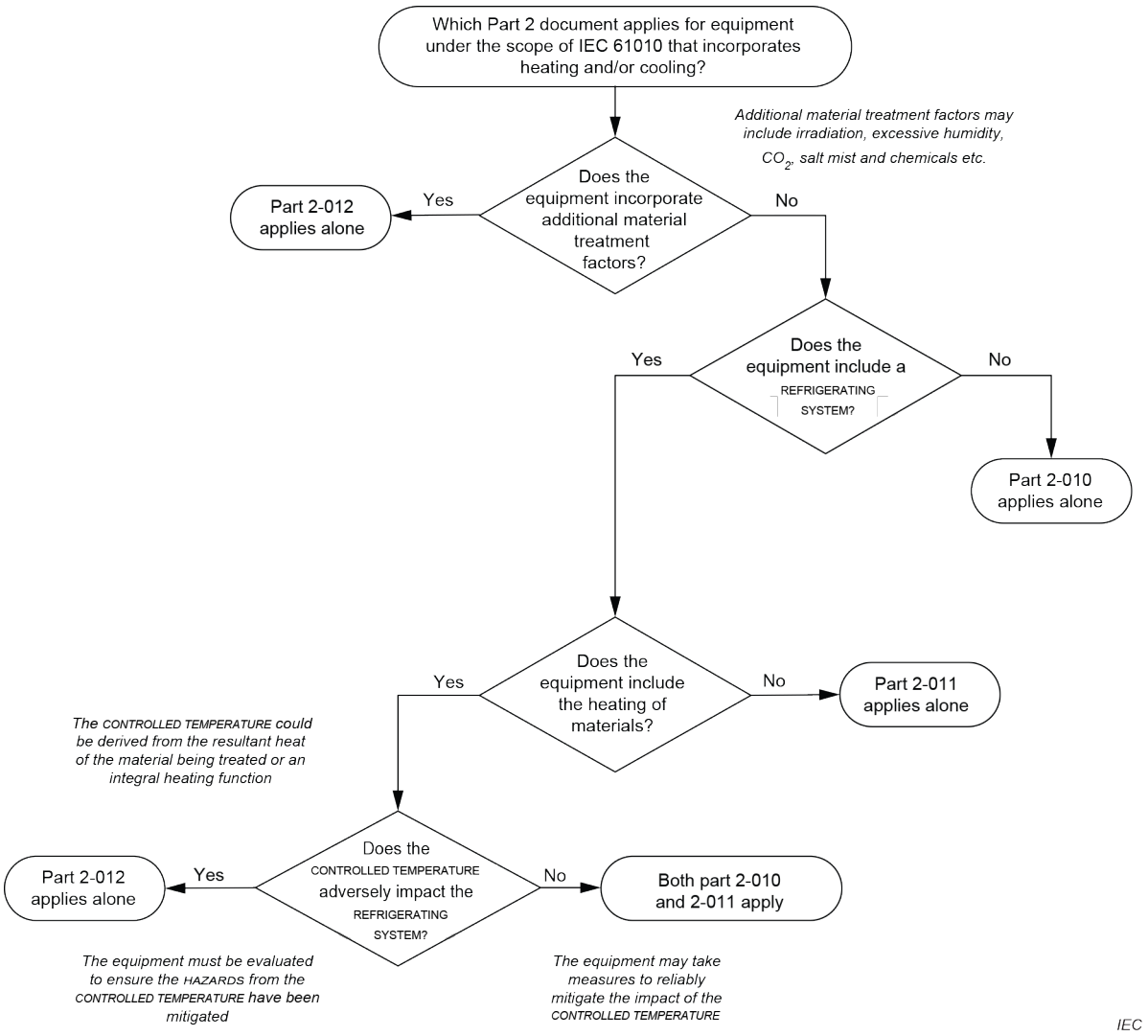

Figure 102 – Flow chart illustrating the selection process

SAFETY REQUIREMENTS FOR ELECTRICAL EQUIPMENT FOR MEASUREMENT, CONTROL AND LABORATORY USE –

Part 2-012: Particular requirements for climatic and environmental testing and other temperature conditioning equipment

1 Scope and object

This clause of Part 1 is applicable except as follows:

1.1.1 Equipment included in scope

Replacement:

Replace the ~~first~~ second paragraph by the following:

~~This group safety publication is primarily intended to be used as a product safety standard for the products mentioned in the scope, but shall also be used by technical committees in the preparation of their publications for products similar to those mentioned in the scope of this standard, in accordance with the principles laid down in IEC Guide 104 and ISO/IEC Guide 51.~~

This part of IEC 61010 specifies safety requirements for electrical equipment and its accessories within the categories a) through c), wherever it is intended to be used, whenever that equipment incorporates one or more of the following characteristics:

– A REFRIGERATING SYSTEM that is acted on or impacted by an integral heating function such that the combined heating and ~~cooling~~ REFRIGERATING SYSTEM generates additional and/or more severe HAZARDS than those for the two systems if treated separately.

– The materials being treated in the intended application introduce significant heat into the REFRIGERATING SYSTEM, so that the ~~cooling~~ REFRIGERATING SYSTEM in the application yields additional and/or more severe HAZARDS than those for the ~~cooling~~ REFRIGERATING SYSTEM if operated at the maximum RATED ambient temperature alone.

– An irradiation function for the materials being treated presenting additional HAZARDS.

– A function to expose the materials being treated to excessive humidity, carbon dioxide, salt mist, or other substances which ~~may~~ can result in additional HAZARDS.

– A function of MECHANICAL MOVEMENT presenting additional HAZARDS.

– Provision for an OPERATOR to walk in to the operating area to load or unload the materials being treated.

Addition:

Add the following text after the last paragraph:

NOTE 101 Examples of such equipment include environmental testing and plant growth TEST CHAMBERS, refrigerating CIRCULATORS which incorporate heating, and recirculating coolers for extracting heat.

~~If~~ It is possible that all or part of the equipment falls within the scope of one or more other Part 2 standards of IEC 61010 as well as within the scope of this standard~~, it should also meet~~. In that case, the requirements of those other Part 2 standards also apply. This document is intended for application when one or more of the additional HAZARDS described in the above dashed listed items are introduced. However, when the equipment incorporates only a REFRIGERATING SYSTEM or only a heating function or a combination of the two without introducing the additional HAZARDS described in the above list, then ~~the application of~~

IEC 61010-2-011 or IEC 61010-2-010 or both, as ~~applicable, shall be considered~~ appropriate, apply instead of this Part 2-012.

See further information in the flow chart (Figure 102) for selection process and guidance in the Introduction.

NOTE 102 Subclause 3.1.107 and Annex BB provide the definition and requirements for the protection of people who are inside WALK-IN EQUIPMENT.

1.1.2 Equipment excluded from scope

Addition:

Add the following items after item j):

aa) equipment for the heating, cooling, and ventilation of laboratories;

bb) sterilizing equipment.

1.2 Object

1.2.1 Aspects included in scope

Addition:

Add ~~two new items to the list~~ the following items after item g):

aa) biohazards (see 13.101);

bb) hazardous chemical substances (see 13.102).

2 Normative references

This clause of Part 1 is applicable, except as follows:

Addition:

IEC 60079-15:2010, *Explosive atmospheres – Part 15: Equipment protection by type of protection "n"*

IEC 60079-20-1, *Explosive atmospheres – Part 20-1: Material characteristics for gas and vapour classification – Test methods and data*

~~IEC 60335-2-24:2010, *Household and similar electrical appliances – Safety – Part 2-24: Particular requirements for refrigerating appliances, ice-cream appliances and ice makers*~~
~~*IEC 60335-2-24:2010/AMD1:2012*~~

IEC 60335-2-34:2012, *Household and similar electrical appliances – Safety – Part 2-34: Particular requirements for motor-compressors*
IEC 60335-2-34:2012/AMD1:2015
IEC 60335-2-34:2012/AMD2:2016

IEC 60950-1:2005, *Information technology equipment – Safety – Part 1: General requirements*

~~IEC 62471, *Photobiological safety of lamps and lamp systems*~~

~~IEC TR 62471-2, *Photobiological safety of lamps and lamp systems – Part 2: Guidance on manufacturing requirements relating to non-laser optical radiation safety*~~

ISO 7010~~:2011~~, *Graphical symbols – Safety colours and safety signs – Registered safety signs* (available at https://www.iso.org/obp)

IEC 61010-2-012

Edition 2.0 2019-04

INTERNATIONAL STANDARD

NORME INTERNATIONALE

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GROUP SAFETY PUBLICATION
PUBLICATION GROUPÉE DE SÉCURITÉ

Safety requirements for electrical equipment for measurement, control, and laboratory use –
Part 2-012: Particular requirements for climatic and environmental testing and other temperature conditioning equipment

Règles de sécurité pour appareils électriques de mesurage, de régulation et de laboratoire –
Partie 2-012: Exigences particulières pour les appareils d'essais climatiques et d'environnement, et autres appareils de conditionnement de température

IEC 61010-2-012:2019-04(en-fr)

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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Part 2-012: Particular requirements for climatic and environmental testing and other temperature conditioning equipment

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INTRODUCTION

This Part 2-012, along with Part 2-010 and Part 2-011, taken together, address the specific HAZARDS associated with the heating and cooling of materials by equipment and are organized as follows:

IEC 61010-2-010	Specifically addresses the HAZARDS associated with equipment incorporating heating systems.
IEC 61010-2-011	Specifically addresses the HAZARDS associated with equipment incorporating REFRIGERATING SYSTEMS.
IEC 61010-2-012	Specifically addresses the HAZARDS associated with equipment incorporating both heating and REFRIGERATING SYSTEMS that interact with each other such that the combined heating and REFRIGERATING SYSTEM yield additional or more severe HAZARDS for the two systems than if treated separately. It also addresses the HAZARDS associated with the treatment of materials by other factors like irradiation, excessive humidity, CO_2 and MECHANICAL MOVEMENT, etc.

Guidance for the application of the appropriate Part 2 standard(s)

When the equipment includes only a material heating system, and no REFRIGERATING SYSTEM or other environmental factors apply, then Part 2-010 applies without needing Part 2-011 or Part 2-012. Similarly, when the equipment includes only a REFRIGERATING SYSTEM, and no material heating system or other environmental factors apply, then Part 2-011 applies without needing Part 2-010 or Part 2-012. However, when the equipment incorporates both a material heating system, and a REFRIGERATING SYSTEM or the materials being treated in the intended application introduce significant heat into the REFRIGERATING SYSTEM, a determination should be made as to whether the interaction between the two systems will generate additional or more severe HAZARDS than if the systems were evaluated separately (CONTROLLED TEMPERATURE, see flow chart for selection process). If the interaction of the heating and cooling functions yields no additional or more severe HAZARDS, then both Part 2-010 and Part 2-011 apply for their respective functions. Conversely, if additional or more severe HAZARDS result from the combining of the heating and cooling functions, or if the equipment incorporates additional material treatment factors, then Part 2-012 applies, but not Part 2-010 or Part 2-011.

What HAZARDS are applicable for a REFRIGERATING SYSTEM?

The typical HAZARDS for a REFRIGERATING SYSTEM (see Figure 101) consisting of a MOTOR-COMPRESSOR, a CONDENSER, an expansion device and an EVAPORATOR include but are not limited to:

– The maximum temperature of LOW-PRESSURE SIDE (return temperature) to the MOTOR-COMPRESSOR. A MOTOR-COMPRESSOR incorporates a REFRIGERANT cooled motor and it should be established that the maximum temperatures of the LOW-PRESSURE SIDE under least favourable condition do not exceed the insulation RATINGS within the motor.

– The maximum pressure of LOW-PRESSURE SIDE at the inlet to the MOTOR-COMPRESSOR. The housing of the MOTOR-COMPRESSOR is exposed to this pressure and so the design RATING of the MOTOR-COMPRESSOR housing should accommodate the worst-case pressures whilst providing the correct safety margin for a pressure vessel.

– The maximum temperature of HIGH-PRESSURE SIDE to the CONDENSER. The temperatures of the HIGH-PRESSURE SIDE under most unfavourable conditions may present a temperature HAZARD if the OPERATOR is exposed to them or if the electrical insulation is degraded.

– The maximum pressure of HIGH-PRESSURE SIDE at the outlet to the MOTOR-COMPRESSOR. The REFRIGERANT components downstream of the MOTOR-COMPRESSOR up to the expansion device are exposed to this pressure and so the design RATING of these components should accommodate the worst-case pressures whilst providing the appropriate safety margin for a pressure vessel.

– The maximum CONTROLLED TEMPERATURES, namely, the SOAKED TEMPERATURE CONDITIONS, from which the heat is being extracted, may impact the maximum temperature of LOW-PRESSURE SIDE to the MOTOR-COMPRESSOR as well as present a temperature HAZARD if the OPERATOR is exposed to them or if the electrical insulation is degraded. Whether this CONTROLLED TEMPERATURE is derived from an integral heating function of the device or from the heat dissipated from the material being cooled, the impact under worst case conditions should be evaluated.

– The current draw of the equipment should be established when including the worst-case running conditions of the REFRIGERATING SYSTEM including any defrost cycles that may apply.

The worst-case conditions should be determined for the equipment and will include both the least favourable NORMAL USE conditions as well as the most unfavourable testing results under SINGLE FAULT CONDITIONS.

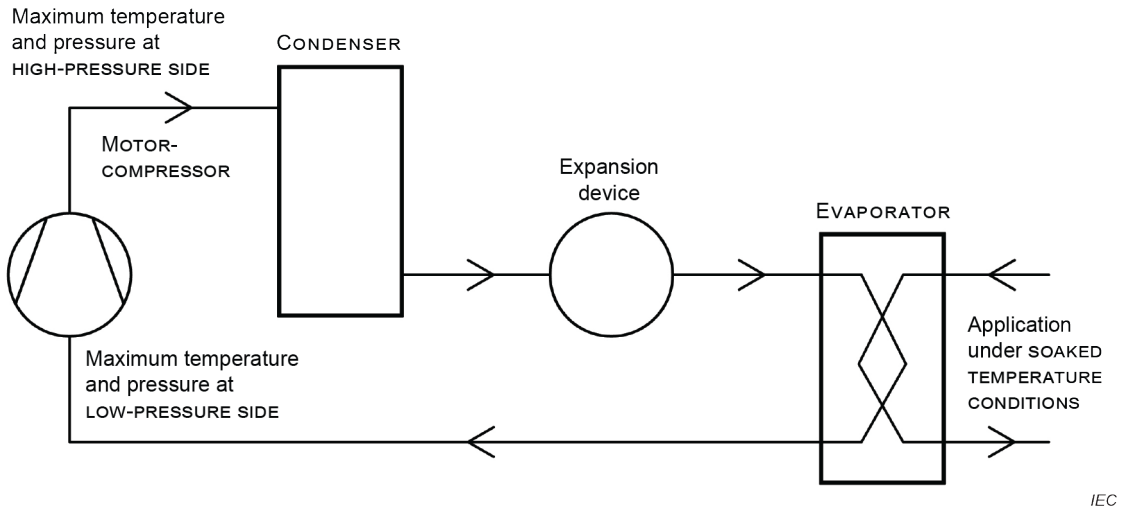

Figure 101 – Schema of a REFRIGERATING SYSTEM incorporating a CONDENSER

The selection process is illustrated in the following flow chart (see Figure 102).

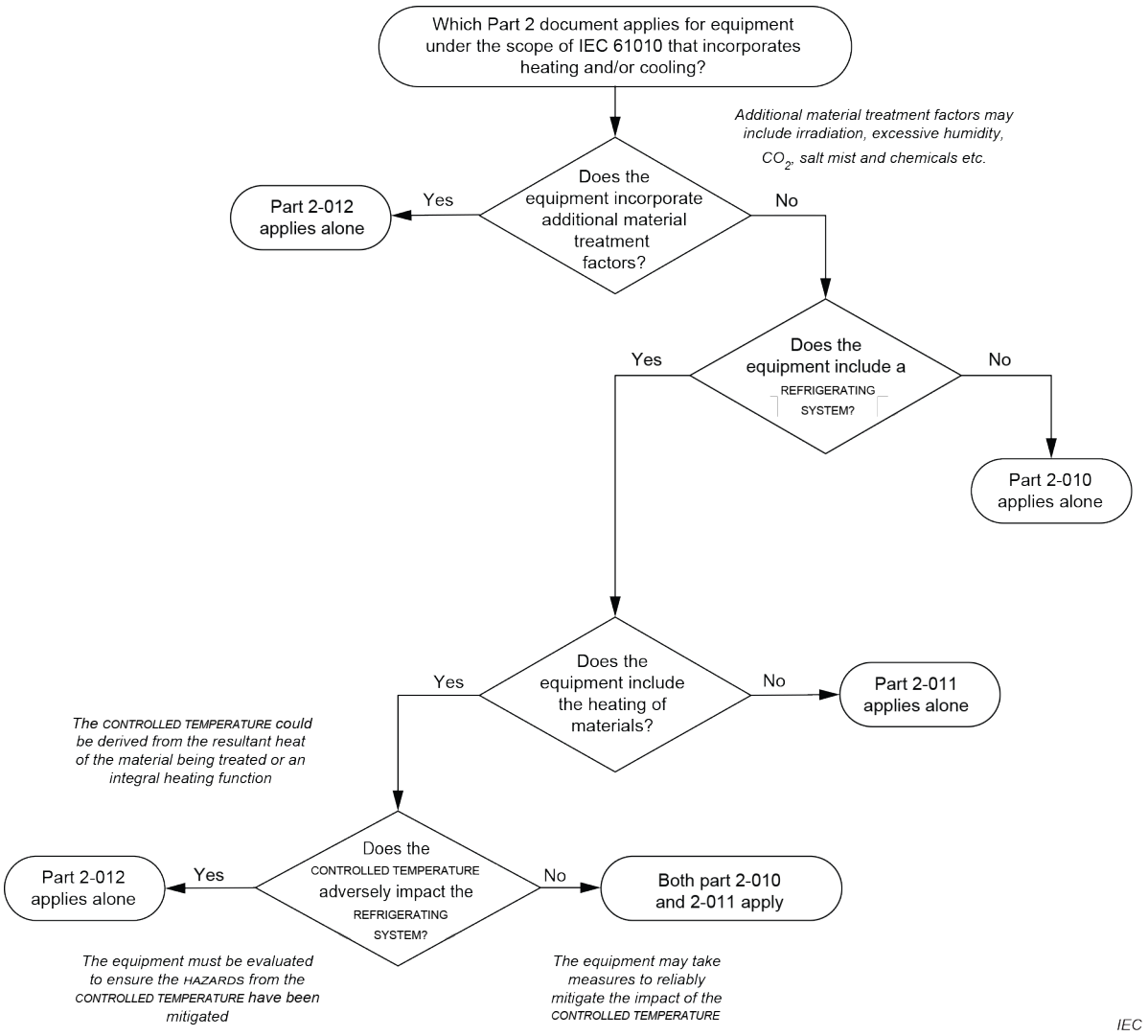

Figure 102 – Flow chart illustrating the selection process

SAFETY REQUIREMENTS FOR ELECTRICAL EQUIPMENT FOR MEASUREMENT, CONTROL AND LABORATORY USE –

Part 2-012: Particular requirements for climatic and environmental testing and other temperature conditioning equipment

1 Scope and object

This clause of Part 1 is applicable except as follows:

1.1.1 Equipment included in scope

Replacement:

Replace the second paragraph by the following:

This part of IEC 61010 specifies safety requirements for electrical equipment and its accessories within the categories a) through c), wherever it is intended to be used, whenever that equipment incorporates one or more of the following characteristics:

– A REFRIGERATING SYSTEM that is acted on or impacted by an integral heating function such that the combined heating and REFRIGERATING SYSTEM generates additional and/or more severe HAZARDS than those for the two systems if treated separately.
– The materials being treated in the intended application introduce significant heat into the REFRIGERATING SYSTEM, so that the REFRIGERATING SYSTEM in the application yields additional and/or more severe HAZARDS than those for the REFRIGERATING SYSTEM if operated at the maximum RATED ambient temperature alone.
– An irradiation function for the materials being treated presenting additional HAZARDS.
– A function to expose the materials being treated to excessive humidity, carbon dioxide, salt mist, or other substances which can result in additional HAZARDS.
– A function of MECHANICAL MOVEMENT presenting additional HAZARDS.
– Provision for an OPERATOR to walk in to the operating area to load or unload the materials being treated.

Addition:

Add the following text after the last paragraph:

NOTE 101 Examples of such equipment include environmental testing and plant growth TEST CHAMBERS, refrigerating CIRCULATORS which incorporate heating, and recirculating coolers for extracting heat.

It is possible that all or part of the equipment falls within the scope of one or more other Part 2 standards of IEC 61010 as well as within the scope of this standard. In that case, the requirements of those other Part 2 standards also apply. This document is intended for application when one or more of the additional HAZARDS described in the above dashed listed items are introduced. However, when the equipment incorporates only a REFRIGERATING SYSTEM or only a heating function or a combination of the two without introducing the additional HAZARDS described in the above list, then IEC 61010-2-011 or IEC 61010-2-010 or both, as appropriate, apply instead of this Part 2-012.

See further information in the flow chart (Figure 102) for selection process and guidance in the Introduction.

NOTE 102 Subclause 3.1.107 and Annex BB provide the definition and requirements for the protection of people who are inside WALK-IN EQUIPMENT.

1.1.2 Equipment excluded from scope

Addition:

Add the following items after item j):

aa) equipment for the heating, cooling, and ventilation of laboratories;

bb) sterilizing equipment.

1.2 Object

1.2.1 Aspects included in scope

Addition:

Add the following items after item g):

aa) biohazards (see 13.101);

bb) hazardous chemical substances (see 13.102).

2 Normative references

This clause of Part 1 is applicable, except as follows:

Addition:

IEC 60079-15:2010, *Explosive atmospheres – Part 15: Equipment protection by type of protection "n"*

IEC 60079-20-1, *Explosive atmospheres – Part 20-1: Material characteristics for gas and vapour classification – Test methods and data*

IEC 60335-2-34:2012, *Household and similar electrical appliances – Safety – Part 2-34: Particular requirements for motor-compressors*
IEC 60335-2-34:2012/AMD1:2015
IEC 60335-2-34:2012/AMD2:2016

IEC 60950-1:2005, *Information technology equipment – Safety – Part 1: General requirements*

ISO 7010, *Graphical symbols – Safety colours and safety signs – Registered safety signs* (available at https://www.iso.org/obp)

SOMMAIRE

COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

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RÈGLES DE SÉCURITÉ POUR APPAREILS ÉLECTRIQUES DE MESURAGE, DE RÉGULATION ET DE LABORATOIRE –

Partie 2-012: Exigences particulières pour les appareils d'essais climatiques et d'environnement, et autres appareils de conditionnement de température

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9) L'attention est attirée sur le fait que certains des éléments de la présente Publication de l'IEC peuvent faire l'objet de droits de brevet. L'IEC ne saurait être tenue pour responsable de ne pas avoir identifié de tels droits de brevets et de ne pas avoir signalé leur existence.

La Norme internationale IEC 61010-2-012 a été établie par le comité d'études 66 de l'IEC: Sécurité des appareils de mesure, de commande et de laboratoire.

Elle a le statut d'une publication groupée de sécurité conformément au Guide IEC 104.

Cette deuxième édition annule et remplace la première édition parue en 2016. Cette édition constitue une révision technique.

Cette édition inclut les modifications techniques majeures suivantes par rapport à la l'édition précédente:

a) alignement sur les modifications introduites par l'Amendement 1 de l'IEC 61010-1:2010;

b) modifications relatives à l'utilisation de petites capitales uniquement pour les termes définis;

c) clarifications concernant les essais de refroidissement au 4.4.2.10;

d) exigences relatives à la protection contre les surtempératures au 10.101, comprenant la suppression de la seconde partie de b) et c);

e) modifications relatives à l'emploi exact des termes "température", "température de fonctionnement", "température de service", "température d'application", "température ambiante" aux 3.5.104, 3.5.105, 4.3.1, 4.3.2, 5.4.2, 8.2.1, 8.2.2, 11.7.2.101.2, 11.7.2.101.3, 13.2.102, 14.102, 15.101, 15.102, 15.103, à l'Introduction et à d'autres nombreux endroits. Pour des besoins de clarification, la définition du 3.5.114, TEMPERATURE REGULEE est ajoutée.

Le texte de cette Norme internationale est issu des documents suivants:

FDIS	Rapport de vote
66/687/FDIS	66/688/RVD

Le rapport de vote indiqué dans le tableau ci-dessus donne toute information sur le vote ayant abouti à l'approbation de cette Norme internationale.

Ce document a été rédigée selon les Directives ISO/IEC, Partie 2.

Une liste de toutes les parties de la série IEC 61010, publiées sous le titre général, *Règles de sécurité pour appareils électriques de mesurage, de régulation et de laboratoire*, peut être consultée sur le site web de l'IEC.

L'IEC 61010-2-012 doit être utilisée conjointement avec la dernière édition de l'IEC 61010-1. Elle a été établie sur la base de la troisième édition (2010) et de son Amendement 1 (2016), ci-après dénommée la Partie 1.

La présente Partie 2-012 complète ou modifie les articles correspondants de l'IEC 61010-1 de façon à la transformer en norme IEC: *Exigences particulières pour les appareils d'essais climatiques et d'environnement, et autres appareils de conditionnement de température.*

Lorsqu'un paragraphe particulier de la Partie 1 n'est pas mentionné dans la présente Partie 2-012, ce paragraphe est applicable pour autant qu'il soit raisonnable. Lorsque la présente Partie 2-012 spécifie "addition", "modification", "remplacement" ou "suppression", il convient d'adapter en conséquence l'exigence, la modalité d'essai ou la note correspondante de la Partie 1.

Dans la présente norme:

1) les caractères d'imprimerie suivants sont utilisés:
   - exigences et définitions: caractères romains;
   - NOTES: petits caractères romains;
   - *conformité et essais: caractères italiques;*
   - termes définis à l'Article 3 et utilisés dans toute cette norme: PETITES CAPITALES ROMAINES.
2) les paragraphes, figures, tableaux et notes qui viennent en supplément de ceux de la Partie 1 sont numérotés à partir de 101. Les annexes supplémentaires sont identifiées par des lettres à partir de AA.

Le comité a décidé que le contenu de ce document ne sera pas modifié avant la date de stabilité indiquée sur le site web de l'IEC sous "http://webstore.iec.ch" dans les données relatives au document recherché. À cette date, le document sera

- reconduit,
- supprimé,
- remplacé par une édition révisée, ou
- amendé.

IMPORTANT – Le logo "*colour inside*" qui se trouve sur la page de couverture de cette publication indique qu'elle contient des couleurs qui sont considérées comme utiles à une bonne compréhension de son contenu. Les utilisateurs devraient, par conséquent, imprimer cette publication en utilisant une imprimante couleur.

INTRODUCTION

La présente Partie 2-012, la Partie 2-010 et la Partie 2-011 pris ensemble, couvrent les DANGERS spécifiques associés à l'échauffement et au refroidissement des matières par des appareils, et sont organisés comme suit:

IEC 61010-2-010	Couvre spécifiquement les DANGERS associés aux appareils comportant des systèmes d'échauffement.
IEC 61010-2-011	Couvre spécifiquement les DANGERS associés aux appareils comportant des SYSTEMES FRIGORIFIQUES.
IEC 61010-2-012	Couvre spécifiquement les DANGERS associés aux appareils comportant à la fois des systèmes de chauffage et des SYSTEMES FRIGORIFIQUES qui interagissent entre eux de sorte que les systèmes FRIGORIFIQUES et de chauffage combinés génèrent des DANGERS supplémentaires ou plus graves pour les deux systèmes que s'ils sont traités séparément. Elle couvre également les DANGERS associés au traitement des matières par d'autres facteurs tels que l'exposition aux rayonnements, une humidité excessive, la présence de CO_2, un MOUVEMENT MECANIQUE, etc.

Recommandations pour l'application de la ou des partie(s) 2 appropriée(s)

Lorsque l'appareil comprend uniquement un système d'échauffement des matières, et aucun SYSTEME FRIGORIFIQUE, ou lorsque d'autres facteurs d'environnement s'appliquent, la Partie 2-010 s'applique sans que la Partie 2-011 ou la Partie 2-012 ne s'avère nécessaire. De façon analogue, lorsque l'appareil comprend uniquement un SYSTEME FRIGORIFIQUE, et aucun système d'échauffement des matières, ou lorsque d'autres facteurs d'environnement s'appliquent, la Partie 2-011 s'applique sans que la Partie 2-010 ou la Partie 2-012 ne s'avère nécessaire. Toutefois, lorsque l'appareil comporte à la fois un système d'échauffement des matières et un SYSTEME FRIGORIFIQUE ou lorsque les matériaux traités dans l'application prévue génèrent une chaleur importante dans le SYSTEME FRIGORIFIQUE, il convient de déterminer si l'interaction entre les deux systèmes engendre des DANGERS supplémentaires ou plus graves que si les systèmes étaient évalués séparément (TEMPERATURE REGULEE, voir organigramme pour le processus de sélection). Lorsque l'interaction des fonctions de chauffage et de refroidissement n'engendre aucun DANGER supplémentaire ou plus grave, les deux Parties 2-010 et 2-011 s'appliquent pour leurs fonctions respectives. Inversement, si des DANGERS supplémentaires ou plus graves proviennent de la combinaison des fonctions de chauffage et de refroidissement, ou lorsque l'appareil inclut des facteurs de traitement des matières supplémentaires, la Partie 2-012 s'applique alors, contrairement aux Parties 2-010 et 2-011.

Quels DANGERS sont applicables dans le cas d'un SYSTEME FRIGORIFIQUE?

Les DANGERS typiques dans le cas d'un SYSTEME FRIGORIFIQUE (voir Figure 101) comprenant un MOTOCOMPRESSEUR, un CONDENSEUR, un dispositif de dilatation et un EVAPORATEUR incluent entre autres:

– La température maximale COTE BASSE PRESSION (température de retour) en direction du MOTOCOMPRESSEUR. Un MOTOCOMPRESSEUR comporte un moteur refroidi par FLUIDE FRIGORIGENE, et il convient d'établir que les températures maximales du COTE BASSE PRESSION dans les conditions les plus défavorables ne dépassent pas les CARACTERISTIQUES ASSIGNEES d'isolation du moteur.

– La pression maximale COTE BASSE PRESSION au niveau de l'admission du MOTOCOMPRESSEUR. L'enveloppe du MOTOCOMPRESSEUR est exposée à cette pression et il convient d'adapter les CARACTERISTIQUES ASSIGNEES de conception du MOTOCOMPRESSEUR aux pressions les plus défavorables tout en fournissant la marge de sécurité correcte pour un récipient sous pression.

– La température maximale COTE HAUTE PRESSION en direction du CONDENSEUR. Les températures COTE HAUTE PRESSION dans les conditions les plus défavorables peuvent présenter un DANGER lié à la température en cas d'exposition de l'OPERATEUR ou de détérioration de l'isolation électrique.

– La pression maximale COTE HAUTE PRESSION au niveau de la sortie du MOTOCOMPRESSEUR. Les composants FRIGORIGENES en aval du MOTOCOMPRESSEUR jusqu'au niveau du dispositif de dilatation sont exposés à cette pression et il convient d'adapter leurs CARACTERISTIQUES ASSIGNEES de conception aux pressions les plus défavorables tout en fournissant la marge de sécurité appropriée pour un récipient sous pression.

– Les TEMPERATURES REGULEES maximales, à savoir les CONDITIONS DE TEMPERATURE DE TREMPAGE auxquelles la chaleur est extraite, peuvent affecter la température maximale COTE BASSE PRESSION en direction du MOTOCOMPRESSEUR, ainsi que présenter un DANGER lié à la température en cas d'exposition de l'OPERATEUR ou de détérioration de l'isolation électrique. Que cette TEMPERATURE REGULEE soit issue d'une fonction de chauffage intégrée du dispositif ou de la chaleur dissipée de la matière refroidie, il convient d'évaluer l'effet dans les conditions les plus défavorables.

– Il convient d'établir l'appel de courant de l'appareil lorsque les conditions de fonctionnement les plus défavorables du SYSTEME FRIGORIFIQUE sont prises en compte, y compris les cycles de dégivrage éventuels qui peuvent s'appliquer.

Il convient de déterminer les conditions les plus défavorables pour les appareils qui comprennent à la fois les conditions d'UTILISATION NORMALE les plus défavorables, et les résultats d'essai les plus défavorables dans des CONDITIONS DE PREMIER DEFAUT.

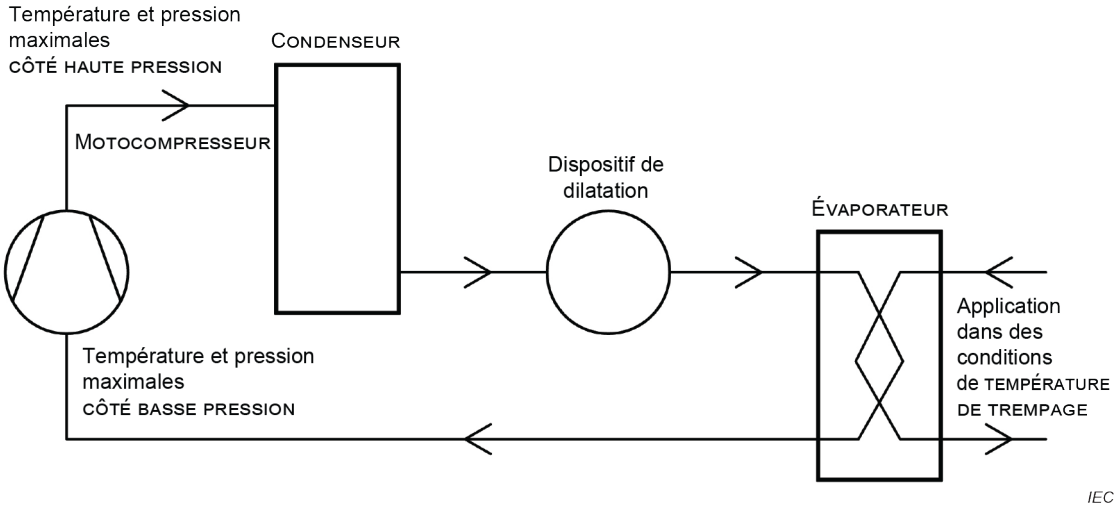
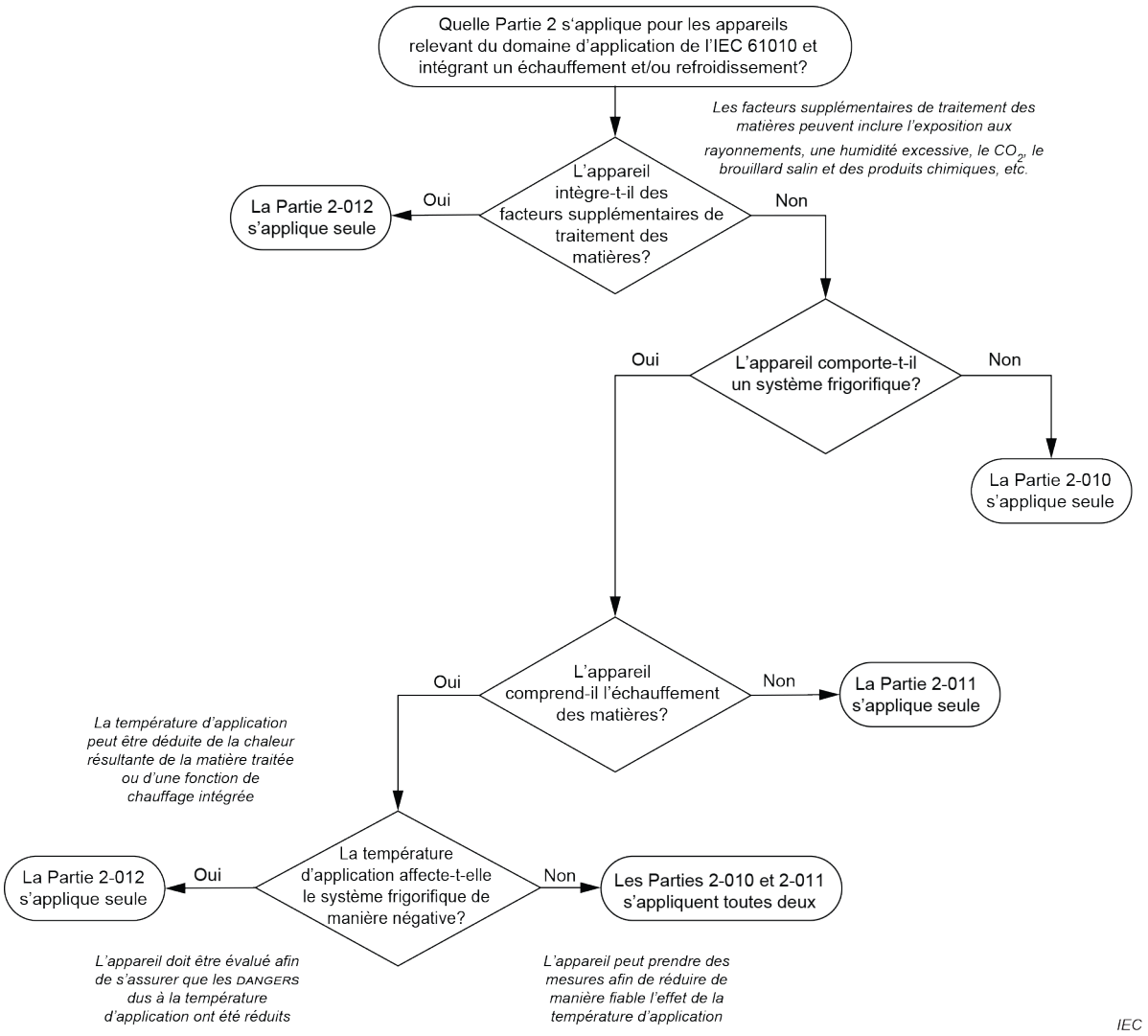


Figure 101 – Schéma d'un SYSTEME FRIGORIFIQUE comportant un CONDENSEUR

Le processus de sélection est représenté dans l'organigramme suivant (voir Figure 102).



NOTE Lire "température régulée" (controlled temperature) en lieu et place de "température d'application".

Figure 102 – Organigramme représentant le processus de sélection

RÈGLES DE SÉCURITÉ POUR APPAREILS ÉLECTRIQUES DE MESURAGE, DE RÉGULATION ET DE LABORATOIRE –

Partie 2-012: Exigences particulières pour les appareils d'essais climatiques et d'environnement, et autres appareils de conditionnement de température

1 Domaine d'application et objet

Cet article de la Partie 1 est applicable à l'exception de ce qui suit:

1.1.1 Appareils inclus dans le domaine d'application

Remplacement:

Remplacer le deuxième alinéa par le suivant:

La présente partie de l'IEC 61010 spécifie les exigences de sécurité pour les appareils électriques et leurs accessoires relevant des catégories a) à c) quelle que soit l'utilisation à laquelle ils sont destinés, lorsque ces appareils comprennent une ou plusieurs des caractéristiques suivantes:

– Un SYSTEME FRIGORIFIQUE affecté ou influencé par une fonction de chauffage intégrée de sorte que le SYSTEME FRIGORIFIQUE et de chauffage combiné engendre des DANGERS supplémentaires et/ou plus graves que ceux pour les deux systèmes s'ils sont traités séparément.
– Les matières traitées dans l'application prévue génèrent une chaleur importante dans le SYSTEME FRIGORIFIQUE, de sorte que le SYSTEME FRIGORIFIQUE dans l'application engendre des DANGERS supplémentaires et/ou plus graves que ceux pour le SYSTEME FRIGORIFIQUE dans le cas où il est utilisé seul à la température ambiante ASSIGNEE maximale.
– Une fonction d'exposition aux rayonnements pour les matières traitées qui présentent des DANGERS supplémentaires.
– Une fonction dédiée à l'exposition des matières traitées à une humidité excessive, au dioxyde de carbone, au brouillard salin ou à d'autres substances qui peuvent engendrer des DANGERS supplémentaires.
– Une fonction de MOUVEMENT MECANIQUE qui présente des DANGERS supplémentaires.
– Un dispositif qui permet le déplacement de l'OPERATEUR vers la zone de manœuvre afin de charger ou décharger les matières traitées.

Addition:

Ajouter le texte suivant après le dernier alinéa:

NOTE 101 Les exemples de ce type d'appareils incluent les ENCEINTES pour essais d'environnement et les ENCEINTES D'ESSAI dédiées à la croissance des plantes, les THERMOSTATS de réfrigération comportant une fonction de chauffage et les refroidisseurs à recirculation pour l'extraction de la chaleur.

Il est possible qu'une ou toutes les parties de l'appareil relèvent du domaine d'application d'une ou plusieurs autres Parties 2 de l'IEC 61010, ainsi que du domaine d'application de la présente norme. Dans ce cas, les exigences de ces autres Parties 2 s'appliquent également. Ce document s'applique lorsqu'un ou plusieurs des dangers supplémentaires décrits dans les alinéas en pointillés ci-dessus sont introduits. Cependant, lorsque l'appareil comprend uniquement un système frigorifique ou uniquement une fonction de chauffage ou une combinaison des deux sans introduire de dangers supplémentaires décrits dans les alinéas

pointillés ci-dessus, alors l'IEC 61010-2-011 ou l'IEC 61010-2-010 ou les deux, selon le cas, s'appliquent en lieu et place de la présente Partie 2-012.

Voir d'autres informations dans l'organigramme (Figure 102) pour le processus de sélection et les recommandations dans l'Introduction.

NOTE 102 Le paragraphe 3.1.107 et l'Annexe BB fournissent la définition et les exigences concernant la protection des personnes qui se trouvent à l'intérieur d'APPAREILS MOBILES.

1.1.2 Appareils exclus du domaine d'application

Addition:

Ajouter les points suivants après le point j):

aa) appareils pour le chauffage, le refroidissement et la ventilation des laboratoires;

bb) appareils de stérilisation.

1.2 Objet

1.2.1 Aspects inclus dans le domaine d'application

Addition:

Ajouter les points suivants après le point g):

aa) DANGERS biologiques (voir 13.101);

bb) substances chimiques dangereuses (voir 13.102).

2 Références normatives

Cet article de la Partie 1 est applicable à l'exception de ce qui suit:

Addition:

IEC 60079-15:2010, *Atmosphères explosives – Partie 15: Protection du matériel par mode de protection "n"*

IEC 60079-20-1, *Atmosphères explosives – Partie 20-1: Caractéristiques des substances pour le classement des gaz et des vapeurs – Méthodes et données d'essai*

IEC 60335-2-34:2012, *Appareils électrodomestiques et analogues – Sécurité – Partie 2-34: Exigences particulières pour les motocompresseurs*
IEC 60335-2-34:2012/AMD1:2015
IEC 60335-2-34:2012/AMD2:2016

IEC 60950-1:2005, *Matériels de traitement de l'information – Sécurité – Partie 1: Exigences générales*

ISO 7010, *Symboles graphiques – Couleurs de sécurité et signaux de sécurité – Signaux de sécurité enregistrés (disponible à l'adresse http://www.iso.org/obp)*