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2-010: ERINÕUDED LABORATOORSETELE
MATERJALIDE KUUMUTAMISE SEADMETELE

Safety requirements for electrical equipment for
measurement, control and laboratory use - Part 2-010:
Particular requirements for laboratory equipment for
the heating of Materials

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

See Eesti standard EVS-EN IEC 61010-2-010:2020 sisaldab Euroopa standardi EN IEC 61010-2-010:2020 ingliskeelset teksti.	This Estonian standard EVS-EN IEC 61010-2-010:2020 consists of the English text of the European standard EN IEC 61010-2-010:2020.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 22.05.2020.	Date of Availability of the European standard is 22.05.2020.
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English Version

**Safety requirements for electrical equipment for measurement,
control and laboratory use - Part 2-010: Particular requirements
for laboratory equipment for the heating of materials
(IEC 61010-2-010:2019)**

Exigences de sécurité pour appareils électriques de
mesurage, de régulation et de laboratoire - Partie 2-010:
Exigences particulières pour appareils de laboratoire
utilisés pour l'échauffement des matières
(IEC 61010-2-010:2019)

Sicherheitsbestimmungen für elektrische Mess-, Steuer-,
Regel- und Laborgeräte - Teil 2-010: Besondere
Anforderungen für Laborgeräte für das Erhitzen von Stoffen
(IEC 61010-2-010:2019)

This European Standard was approved by CENELEC on 2019-03-19. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

European foreword

This document (EN IEC 61010-2-010:2020) consists of the text of IEC 61010-2-010:2019 prepared by IEC/TC 66 "Safety of measuring, control and laboratory equipment".

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2020-11-22
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2023-05-22

This document supersedes EN 61010-2-010:2014 and all of its amendments and corrigenda (if any).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For the relationship with EU Directive(s) see informative Annex ZZ, which is an integral part of this document.

EN IEC 61010-2-010:2020 includes the following significant changes with respect to EN 61010-2-010:2014:

- adaptation of changes introduced by Amendment 1 of 61010-1;
- alignment with 61010-2-011 and 61010-2-012:
 - New matching Introduction clarifying which standard(s) to use;
 - new clause 5.4.102 instructions for flammable liquid heat transfer medium;
 - clause 9.5 on flammable liquids replaced with text from 2-012;
- Equipment with high accessible current deleted;
- requirements in 10.101 b) and c) clarified;
- editorial corrections.

Endorsement notice

The text of the International Standard IEC 61010-2-010:2019 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following note has to be added for the standard indicated:

IEC 60335-2-6:2014 NOTE Harmonized as EN 60335-2-6:2015

Annex ZA

(normative)

Normative references to international publications with their corresponding European publications

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.

NOTE 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

Annex ZA of EN 61010-1:2010/A1:2019 is applicable with the following additions:

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
ISO 7010	2011	Graphical symbols — Safety colours and safety signs — Registered safety signs	EN ISO 7010	2012
+Amd1				
+Amd2				
+Amd3				
+Amd4				
+Amd5				
+Amd6				
+Amd7				
+Amd8				

Annex ZZ

(informative)

Relationship between this European standard and the safety objectives of Directive 2014/35/EU [2014 OJ L96] aimed to be covered

This European Standard has been prepared under a Commission's standardization request relating to harmonized standards in the field of the Low Voltage Directive, M/511, to provide one voluntary means of conforming to safety objectives of Directive 2014/35/EU of the European Parliament and of the Council of 26 February 2014 on the harmonization of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits [2014 OJ L96].

Once this standard is cited in the Official Journal of the European Union under that Directive, compliance with the normative clauses of this standard given in Table ZZ.1 confers, within the limits of the scope of this standard, a presumption of conformity with the corresponding safety objectives of that Directive, and associated EFTA regulations.

Table ZZ.1 – Correspondence between this European standard and Annex I of Directive 2014/35/EU [2014 OJ L96]

Safety objectives of Directive 2014/35/EU (Annex I)	Clause(s) / sub-clause(s) of this EN	Remarks / Notes
1. General conditions		
1 (a) the essential characteristics, the recognition and observance of which will ensure that electrical equipment will be used safely and in applications for which it was made, shall be marked on the electrical equipment, or, if this is not possible, on an accompanying document	5.1 5.2 5.4	
1 (b) the electrical equipment, together with its component parts, shall be made in such a way as to ensure that it can be safely and properly assembled and connected	6.6 6.10 6.11 Annex F	
1 (c) the electrical equipment shall be so designed and manufactured as to ensure that protection against the hazards set out in points 2 and 3 is assured, providing that the equipment is used in applications for which it was made and is adequately maintained	5.4 17 (for hazards not covered by clauses 6-16) See also the details in points 2 and 3	

Safety objectives of Directive 2014/35/EU (Annex I)	Clause(s) / sub-clause(s) of this EN	Remarks / Notes
2. Protection against hazards arising from the electrical equipment Measures of a technical nature shall be laid down in accordance with point 1, in order to ensure that:		
2 (a) persons and domestic animals are adequately protected against the danger of physical injury or other harm which might be caused by direct or indirect contact	4, 6.1 – 6.11, 9.6, 11.6, Annex F, Annex K	
2 (b) temperatures, arcs or radiation which would cause a danger, are not produced	4.4.4.2, 9.5, 9.6, 10.1 - 10.5, 10.101, 12	
2 (c) persons, domestic animals and property are adequately protected against non-electrical dangers caused by the electrical equipment which are revealed by experience	4.4, 7.2- 7.7, 9, 12.3, 12.5, 12.6, 13.1, 13.2, 16.2	
2 (d) the insulation is suitable for foreseeable conditions	6.7, Annex K	
3. Protection against hazards which may be caused by external influences on the electrical equipment Technical measures shall be laid down in accordance with point 1, in order to ensure that the electrical equipment:		
3 (a) meets the expected mechanical requirements in such a way that persons, domestic animals and property are not endangered	7, 8	
3 (b) is resistant to non-mechanical influences in expected environmental conditions, in such a way that persons, domestic animals and property are not endangered	1.4, 6.7.2.2.1, 10.5, 10.101, 11.6, 14.3, 14.8, 15	
3 (c) does not endanger persons, domestic animals and property in foreseeable conditions of overload	4, 9, 14, 16.1	

WARNING 1 — Presumption of conformity stays valid only as long as a reference to this European standard is maintained in the list published in the Official Journal of the European Union. Users of this standard should consult frequently the latest list published in the Official Journal of the European Union.

WARNING 2 — Other Union legislation may be applicable to the product(s) falling within the scope of this standard.

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**SAFETY REQUIREMENTS FOR ELECTRICAL EQUIPMENT
FOR MEASUREMENT, CONTROL AND LABORATORY USE –****Part 2-010: Particular requirements for laboratory
equipment for the heating of materials**

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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International Standard IEC 61010-2-010 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 fourth edition cancels and replaces the third edition published in 2014. 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) alignment with IEC 61010-2-011 and IEC 61010-2-012:

- new matching Introduction clarifying which standard(s) to use;
 - new 5.4.101 instructions for flammable liquid HEAT TRANSFER MEDIUM;
 - subclause 9.5 on flammable liquids replaced with text from IEC 61010-2-012;
- c) subclause 5.2.101 deleted;
- d) requirements in 10.101 b) and c) clarified.

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

CDV	Report on voting
66/657/CDV	66/678/RVC

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.

This Part 2-010 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 2-010 supplements or modifies the corresponding clauses in IEC 61010-1 so as to convert that publication into the IEC standard: *Particular requirements for laboratory equipment for the heating of materials*.

Where a particular subclause of Part 1 is not mentioned in this Part 2-010, that subclause applies as far as is reasonable. Where this Part 2-010 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: in roman type;
 - NOTES in small roman type;
 - *conformity and test: 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 web site under "<http://webstore.iec.ch>" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- 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 document using a colour printer.

INTRODUCTION

This Part 2-010, Part 2-011 and Part 2-012, 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 cooling 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 of Figure 102 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 must be established that the maximum temperatures of 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 must 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 must accommodate the worst-case pressures whilst providing the appropriate safety margin for a pressure vessel.
- The maximum controlled temperatures, namely, the soaked temperature conditions, where the heat is being extracted from, 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 need to 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.

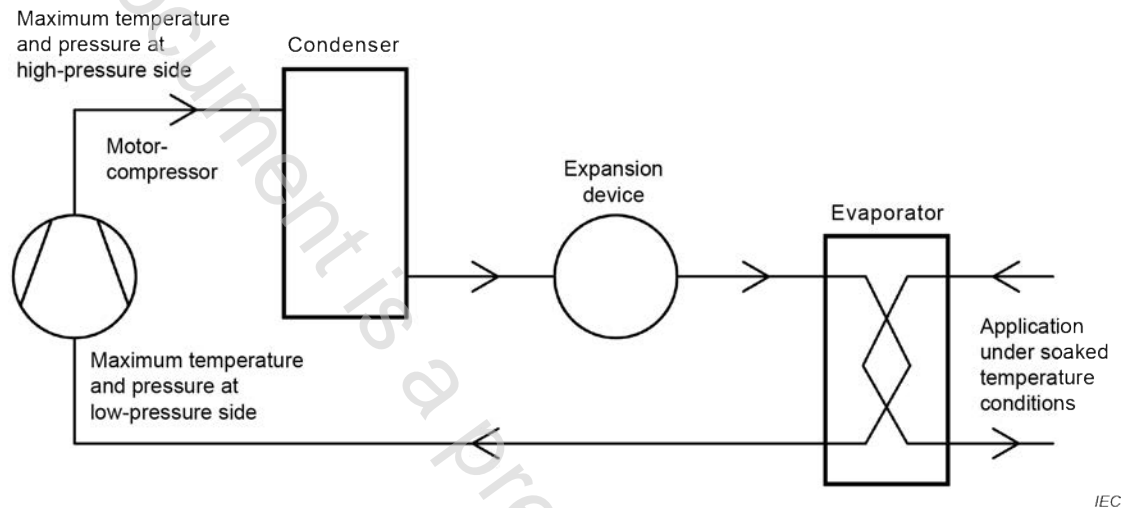


Figure 101 – Schema of a refrigerating system incorporating a condenser