UL 61010-2-010

STANDARD FOR

Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use – Part 2-010: Particular Requirements for Laboratory Equipment for the Heating of Materials

UL Standard for Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use – Part 2-010: Particular Requirements for Laboratory Equipment for the Heating of Materials, UL 61010-2-010

Fourth Edition, Dated June 27, 2019

Summary of Topics

Adoption of IEC 61010-2-010, Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use – Part 2-010: Particular Requirements for Laboratory Equipment for the Heating of Materials (fouth edition issued February 2019) as a new IEC-based UL standard, UL 61010-2-010, with no National Differences.

The new requirements are substantially in accordance with Proposal(s) on this subject dated March 29, 2019.

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UL 61010-2-010

Standard for Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use – Part 2-010: Particular Requirements for Laboratory Equipment for the Heating of Materials

Third Edition – January 2015

Fourth Edition

June 27, 2019

This ANSI/UL Standard for Safety consists of the Fourth Edition.

The most recent designation of ANSI/UL 61010-2-010 as an American National Standard (ANSI) occurred on June 18, 2019. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, Title Page, or Preface. The IEC Foreword is also excluded from the ANSI approval of IEC-based standards.

Comments or proposals for revisions on any part of the Standard may be submitted to UL at any time. Proposals should be submitted via a Proposal Request in UL's On-Line Collaborative Standards Development System (CSDS) at https://csds.ul.com.

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Annex A (normative) Insulation requirements not covered by 6.7

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Preface

This UL Standard is based on IEC Publication 61010-2-010: fourth edition 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 publication 61010-2-010 is copyrighted by the IEC.

Efforts have been made to synchronize the UL edition number with that of the corresponding IEC standard with which this standard is harmonized. As a result, one or more UL edition numbers have been skipped to match that of the IEC edition number.

This UL Standard 61010-2-010 Standard for Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use – Part 2-010: Particular Requirements for Laboratory Equipment for the Heating of Materials, is to be used in conjunction with the third edition of UL 61010-1. The requirements for laboratory equipment for the heating of materials are contained in this Part 2 Standard and UL 61010-1.

Requirements of this Part 2 Standard, where stated, amend the requirements of UL 61010-1.

Where a particular subclause of UL 61010-1 is not mentioned in UL 61010-2-010, the UL 61010-1 subclause applies.

Note – Although the intended primary application of this Standard is stated in its Scope, it is important to note that it remains the responsibility of the users of the Standard to judge its suitability for their particular purpose.

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FOREWORD

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

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 cooperation 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 deal t 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.

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7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.

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.

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

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.

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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.

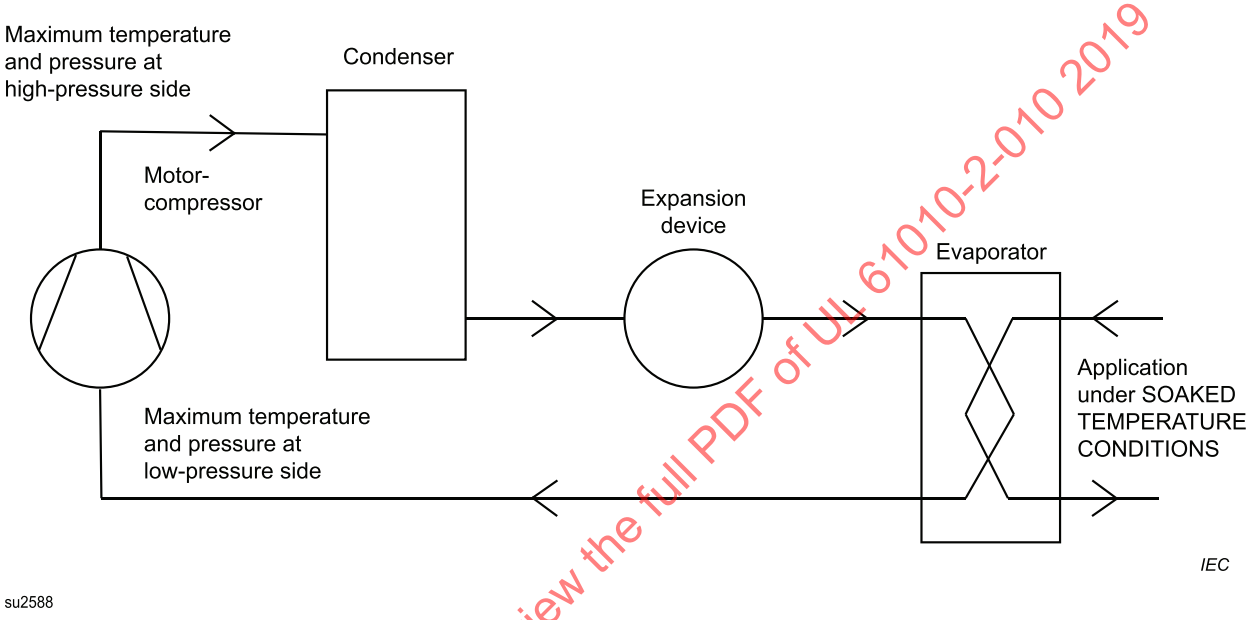

Figure 101
Schema of a refrigerating system incorporating a condenser

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

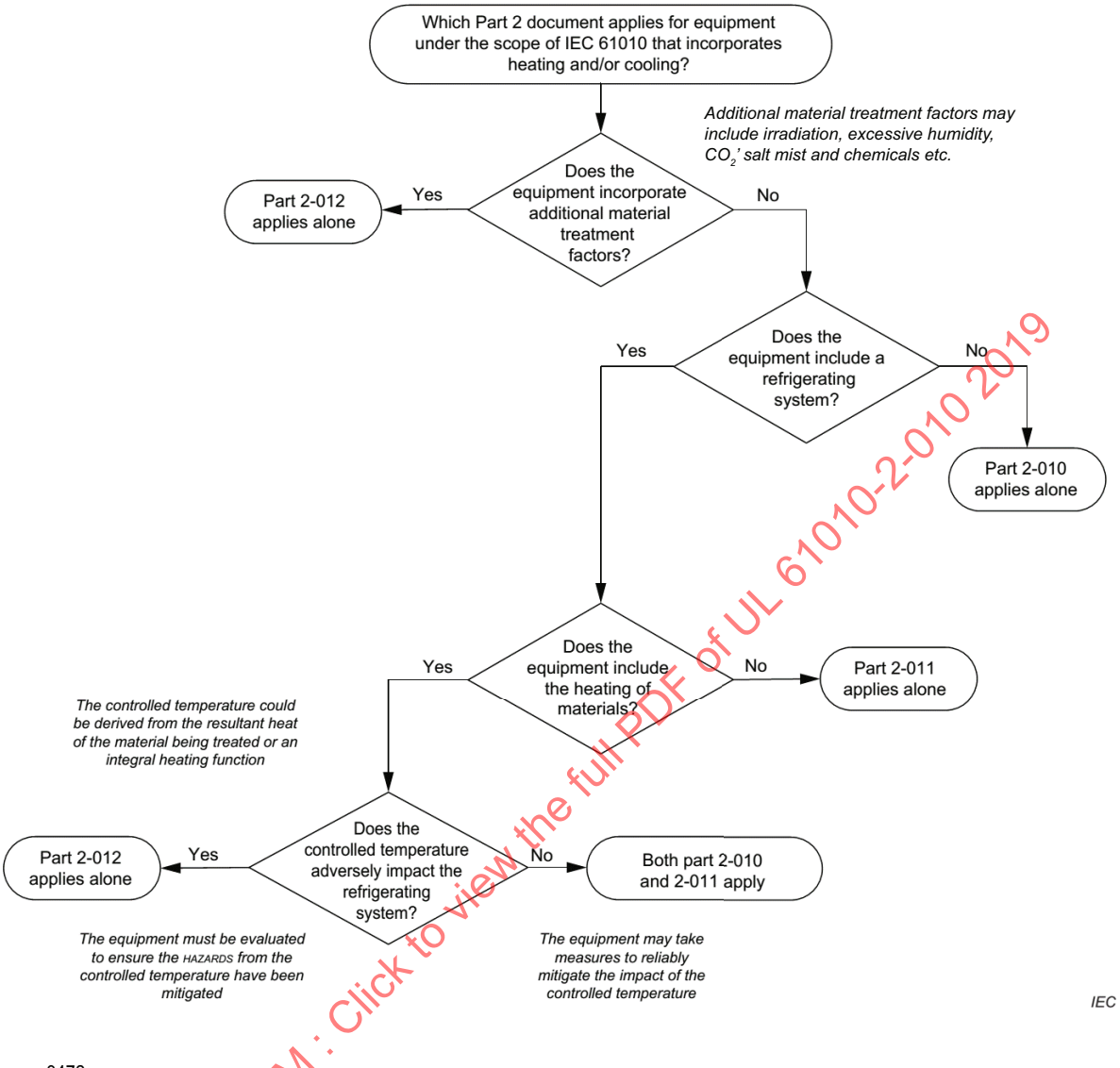

Figure 102
Flow chart illustrating the selection process

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

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 particular safety requirements for the following types a) to c) of electrical equipment and their accessories, wherever they are intended to be used, whenever the heating of materials is one of the functions of the equipment.

Addition:

Add the following text after item c):

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 will also apply. In particular, if equipment is intended to be used for in vitro diagnostic (IVD) purposes, the requirements of IEC 61010-2-101 will also apply. However, when the equipment incorporates a refrigerating system and a heating function where the combination of the two introduces additional or more severe HAZARDS than if treated separately, then it is possible that IEC 61010-2-012 is applicable instead of this Part 2-010.

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

1.1.2 Equipment excluded from scope

Addition:

aa) equipment for the heating and ventilation of laboratories;

bb) sterilizing equipment;

cc) heating and/or cooling equipment which the OPERATOR is intended to enter, and which is large enough for the OPERATOR to remain inside with the door or doors closed.

2 Normative references

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

Addition:

Add the following reference to the list:

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

3 Terms and definitions

This clause of Part 1 is applicable except as follows:

3.2 Parts and accessories

Addition:

3.2.101
HEAT TRANSFER MEDIUM
medium used to transfer heat to the material being processed

4 Tests

This clause of Part 1 is applicable except as follows:

4.4.2.11 Heating devices

Addition:

Add the following new text after the existing text:

If a HAZARD could be caused by over-filling or under-filling with a liquid HEAT TRANSFER MEDIUM, the equipment shall be tested when it is empty, partially filled, or overfilled, whichever is least favourable. In case of doubt, the test shall be carried out in more than one condition. The HEAT TRANSFER MEDIUM used for the test shall be of a type specified for NORMAL USE.

5 Marking and documentation

This clause of Part 1 is applicable except as follows:

5.1.3 MAINS supply

Addition:

Add the following new text to the end of item c):

If, for periods of 1 min or less after switching on, the actual power or current can be much higher than the marked maximum RATED power or current, the short-term maximum may be marked in brackets after the maximum RATED power or current.

Addition:

Add the following new symbol to Table 1:

Table 1
Symbols

Number	Symbol	Publication	Description
101	 Background colour - yellow (optional, not green); symbol and outline - black (optional).	ISO 7010 - W021:2011-05	Warning: Flammable material

su1915a

5.1.6 Switches and circuit-breakers

Addition:

Add the following new text after the last paragraph, before the conformity statement:

For ovens and similar equipment, there shall be an indication of the "ON" condition on each side of the equipment which has a door in it or has any other opening intended for loading material.

5.4.3 Equipment installation

Replacement:

Replace the text with the following new text:

The documentation shall include installation and specific commissioning instructions and, if necessary for safety, warnings against HAZARDS which could arise during installation or commissioning or as a result of improper installation or commissioning of the equipment. Such information includes, if applicable:

a) assembly, location and mounting requirements. If a HAZARD could be caused by hot items falling from the equipment, for example when a door is opened, there shall be a warning that the equipment shall not be mounted on a surface of flammable material;

b) instructions for protective earthing;

c) connections to the supply, and for equipment in which HAZARDOUS LIVE parts may need to be ACCESSIBLE (see 6.1.2), a statement requiring the fitting of a residual current-operated circuit-breaker;

d) for PERMANENTLY CONNECTED EQUIPMENT:

1) supply wiring requirements;

2) requirements for any external switch or circuit-breaker (see 6.11.3.1) and external overcurrent protection devices (see 9.6.2), and a recommendation that the switch or circuit-breaker be near the equipment;

e) ventilation requirements;

f) requirements and safety characteristics for special external services, for example: maximum and minimum temperatures, pressure, or flow of air or cooling liquid.

g) the maximum sound level produced by equipment which emits sound, if measurement is required by 12.5.1;

h) instructions relating to sound level (see 12.5.1);

i) any requirement for drying-out (see 5.4.3.101);

j) if the heating of materials could lead to liberation of hazardous substances: installation instructions shall warn of any need for an extraction system, additional temperature-limiting devices relating to safe temperatures for the materials, or other necessary measures (see also Note 2 to 5.4.1).

NOTE An extraction system is a system which removes air from the building, not a recirculating system.

It is recommended to add a statement in the documentation for the installation that the safety of any system incorporating the equipment is the responsibility of the assembler of the system.

Conformity is checked by inspection.

Addition:

Add the following new subclause:

5.4.3.101 Drying-out

If, after transport or storage in humid conditions, equipment could fail to meet all the safety requirements of this document, the installation instructions shall specify a period of operation to dry out the equipment and restore it to NORMAL CONDITION. The instructions shall include a warning that the equipment cannot be assumed to meet all the safety requirements of this document during the drying-out process.

Conformity is checked by inspection.

5.4.4 Equipment operation

Addition:

Add the following at the end of item g):

(see 5.4.4.101);

Add the following after item j):

aa) specification of additional protection needed by the OPERATOR when HAZARDOUS LIVE parts are permitted to be ACCESSIBLE (see 6.1.2.101);

bb) a warning about any possible HAZARDS of explosion, implosion, or the release of toxic or flammable gases arising from the materials being heated see also 5.4.4 h));

cc) specification of HEAT TRANSFER MEDIA which are suitable for use, for example liquids for use in a heating bath;

dd) specific requirements for ventilation.

Addition:

Add the following new subclause:

5.4.4.101 Cleaning and decontamination

The instructions shall include recommendations for cleaning and, where necessary, decontamination, together with the recognized generic names of recommended materials for cleaning and decontamination, and an indication of any materials which could be likely to be used but which are incompatible with parts of the equipment or with material contained in it.

The instructions shall also state that the RESPONSIBLE BODY shall ensure that:

a) appropriate decontamination is carried out if hazardous material is spilled onto or into the equipment;

b) no decontamination or cleaning agents are used which could cause a HAZARD as a result of a reaction with parts of the equipment or with material contained in it;

c) the manufacturer or its agent is consulted if there is any doubt about the compatibility of decontamination or cleaning agents with parts of the equipment or with material contained in it.

Manufacturers should be aware of the internationally recognized "Laboratory Biosafety Manual", published by the World Health Organization in Geneva, which gives information on decontaminants, their use, dilutions, properties and potential applications. There are also nation al guidelines which cover these areas.

Cleaning and decontamination may be necessary as a safeguard when laboratory heating equipment and any accessories are maintained, repaired, or transferred. Manufacturers should provide a document for the RESPONSIBLE BODY to certify that such treatment has been carried out.

Conformity is checked by inspection.

5.4.5 Equipment maintenance and service

Addition:

Add the following new text:

If a high-temperature cable or other special cable is used for the MAINS supply cord, the instructions shall state that it is to be replaced by an equivalent cable only.

If practicable, instructions shall specify methods for the RESPONSIBLE BODY to check the effective operation of devices or systems for overtemperature protection or liquid-level protection which are necessary for safety, and shall state how often the checks need to be made.

Addition:

Add the following new subclause:

5.4.101 Additional instructions for equipment intended for use with flammable liquid HEAT TRANSFER MEDIUM

For baths, circulators and shaking baths intended for use with flammable liquid HEAT TRANSFER MEDIUM, the instructions shall include sufficient information to ensure the safe handling, servicing and disposal of the equipment.

The instructions shall include the substance of the following warnings as necessary:

– WARNING: Ensure all ventilation openings are not obstructed;

– WARNING: No smoking! No flame! Do not use electrical parts which can produce spark when operating around the equipment and the application system;

– WARNING: Drain and recover the liquid when the equipment idles, if the liquid heat transfer medium is used with an open bath tank and if it is highly volatile at ambient temperature.

A label carrying symbol 101 shall be provided with equipment which can be used with a flammable liquid HEAT TRANSFER MEDIUM along with instructions for the RESPONSIBLE BODY to affix the label visibly on the equipment if it is to be used with a flammable liquid HEAT TRANSFER MEDIUM.

The instructions shall be provided with detailed information for procedures to reduce the RISK with regard to the use of a flammable liquid HEAT TRANSFER MEDIUM, including how the adjustable temperature-limiting device is adequately set so that the surface temperature in contact with the liquid is below the limit of 9.5 a).

Conformity is checked by inspection.

6 Protection against electric shock

This clause of Part 1 is applicable except as follows:

6.1 General

6.1.1 Requirements

Addition:

Add the following new text after the conformity statement:

If a drying-out process is specified (see 6.7.2.2.101), this is carried out in accordance with the installation instructions (see 5.4.3.101) before making the measurements of 6.3. Drying-out is followed by a rest period of 2 h, with the equipment de-energized, before the measurements are taken.

Measurements are made with the equipment at ambient temperature. If there is doubt whether the permissible limits could be exceeded at the maximum controlled temperature, the relevant measurements are repeated at the maximum controlled temperature and the higher values are used.

Addition:

Add the following new subclause:

6.1.2.101 Exceptions for ovens and furnaces

HAZARDOUS LIVE parts are permitted to be ACCESSIBLE if efficient operation of an oven or furnace would otherwise be impossible for one or more of the following reasons:

a) continuous access is needed (for example, conveyor ovens and tube furnaces);

b) ports are needed for observation or for the insertion of probes or sensors;

c) it is necessary to maintain a steady controlled temperature to prevent thermal shock to materials being treated, and therefore ACCESSIBLE heaters, etc., have to remain energized even when a door is opened.

In the above cases, ACCESSIBLE internal parts are permitted to be HAZARDOUS LIVE only if all the following conditions as applicable are met:

1) the HAZARDOUS LIVE parts are supplied from a circuit protected by a residual current operated circuit-breaker which interrupts the supply at a differential current of 30 mA or less, or the installation instructions specify that the equipment shall be connected to a supply source which incorporates such a circuit-breaker;

2) warning markings give notice of the potential HAZARD and a lamp indicates the presence of the HAZARD (symbol 12 of Table 1);

3) conveyor belts, muffles, etc., which are conductive are connected to the PROTECTIVE CONDUCTOR TERMINAL;

4) the instructions for use state that it is necessary for the OPERATOR to be protected against electric shock, including electric shock resulting from the possibility of simultaneous contact with HAZARDOUS LIVE parts and parts connected to the PROTECTIVE CONDUCTOR TERMINAL, and indicate the means of protection. These protective means may include one or more of t he following:

i) insulated TOOLS;

ii) insulating clothing;

iii) OPERATOR standing on an insulating surface;

iv) shrouding of parts connected to the PROTECTIVE CONDUCTOR TERMINAL with which the OPERATOR might come into contact in NORMAL USE.

Conformity is checked by inspection.

6.3.1 Levels in NORMAL CONDITION

Addition:

Add the following new text to the end of item b) 1):

Levels for PERMANENTLY CONNECTED EQUIPMENT are 1,5 times these values.

6.3.2 Levels in SINGLE FAULT CONDITION

Addition:

Add the following new text to the end of item b) 1):

Levels for PERMANENTLY CONNECTED EQUIPMENT are 1,5 times these values.

6.7.2.2 Solid insulation

Addition:

Add the following new subclause:

6.7.2.2.101 Drying-out time

If the performance requirements of the equipment cannot be achieved without the use of hygroscopic heater insulation it is permissible for equipment to require a period of operation to dry out the insulation before meeting the requirements of 6.7.2.2, 6.3.1 and 6.8.2 provided the RESPONSIBLE BODY is made aware of this (see 5.4.3.101).

Conformity is checked by performing the drying-out process specified in the user manual (see 5.4.3.101) before conducting the tests of 6.3.1 and 6.8.2.

6.8.2 Humidity preconditioning

Addition:

Add the following new text at the end of the existing text:

If a drying-out process is specified (see 6.7.2.2.101), this is carried out in accordance with the operator manual (see 5.4.3.101) before the tests of 6.8.3. Drying-out is followed by a rest period of 2 h with the equipment de-energized. The tests are then performed and completed within 1 h of the end of the rest period.

If there is doubt as to whether the equipment would pass a particular test at maximum controlled temperature, then that test is repeated at maximum controlled temperature.

Equipment for which a drying-out period is specified (see 5.4.3.101) shall not be subjected to humidity preconditioning.

6.8.3.1 The a.c. voltage test

Replacement:

Replace the first sentence by the following new sentence:

The voltage tester shall be capable of maintaining the test voltage throughout the test within ±5 % of the specified value.

6.9.2 Insulating materials

Addition:

Add the following note before the conformity statement:

NOTE Although ceramics can provide satisfactory electrical insulation at ambient temperature, their insulating properties are reduced at high temperatures. This is not only because they are susceptible to progressive mechanical deterioration, but also because they can become electrically conductive at high temperatures and in NORMAL USE can be contaminated by conductive material.

6.10.1 MAINS supply cords

Addition:

Add the following new text to the third paragraph:

Alternatively, additional protection shall be provided to prevent the cord from coming into contact with the hot surface.

Add the following new text to the fourth paragraph:

The appliance coupler shall have a temperature RATING above the temperatures measured under NORMAL CONDITION on any part of the appliance coupler itself.

7 Protection against mechanical HAZARDS

This clause of Part 1 is applicable.

8 Resistance to mechanical stresses

This clause of Part 1 is applicable except as follows:

8.1 General

Addition:

Add the following new item to the numbered list:

4) for heating equipment with a horizontal surface of glass or ceramic, the test of 8.2.101.

8.2.2 Impact test

Addition:

Add the following new text before the first paragraph:

For heating equipment with a horizontal surface of glass, ceramic, or similar material, this surface shall be tested as specified in 8.2.101. The rest of the equipment is tested as specified below.

Addition:

Add the following new subclause:

8.2.101 Dynamic test of horizontal heating surfaces of glass or ceramic material

Conformity to the requirements for horizontal heating surfaces made of glass or ceramic material is checked after performing the treatment of a) to c).

a) The heater is operated at the maximum setting until the surface temperature of the heating zone does not rise by more than 1 °C in 15 min. The heater is then switched off, and a loaded vessel is dropped flat 10 times from a height of 150 mm onto the heating zone. The loaded vessel has a copper or aluminium base which is flat over a diameter of 120 mm ± 10 mm, with a rounded edge having a radius of at least 10 mm. It is filled to a uniform height with sand or shot to give a total mass of 1,8 kg ± 0,01 kg.

b) After the above treatment to each heating zone in turn, the heater is again operated at the maximum setting until the surface temperature does not rise by more than 1 °C in 15 min. (1 l ± 0,1 l) of a saline solution of 1 % NaCl in water, at a temperature of 15 °C ± 5 °C, is poured steadily onto the heating surface. The heater is then switched off and after 15 min all excess solution is cleaned off the surface.

c) The heater is allowed to cool to approximately ambient temperature, then the same quantity of the saline solution is poured steadily onto the heating surface and again all excess solution is cleaned off the surface.

A voltage test according to 6.8 applicable to the type of insulation (see 6.7) shall be performed. The test voltage shall be for BASIC INSULATION. No breakdown shall occur.

No breakage of glass parts shall have occurred which could cause a cutting HAZARD.

NOTE Subclause 8.2.101 corresponds to 21.102 of IEC 60335-2-6:2014.

9 Protection against the spread of fire

This clause of Part 1 is applicable except as follows:

9.5 Requirements for equipment containing or using flammable liquids

Replacement:

Replace item a) and Note 1 by the following:

a) The equipment shall be so constructed that it complies with items 1), 2) and 3) as follows:

3) In NORMAL CONDITION and SINGLE FAULT CONDITION, the surface temperature of the flammable liquid shall not exceed the flash point of the liquid being exposed to the air.

4) In NORMAL CONDITION and SINGLE FAULT CONDITION, the surface temperature of any heating device at the surface of the flammable liquid and in contact with air shall not exceed (t − 25) °C, where t is the fire point of the liquid.

5) For equipment where an OPERATOR setting could expose a flammable liquid to a condition where 1) or 2) could be exceeded in the case of a SINGLE FAULT CONDITION during REASONABLY FORESEEABLE MISUSE, additional measures shall be provided to protect the OPERATOR from this HAZARD.

– For example, a liquid level cut out that disables the heating device before the temperature requirements of a) 1) or 2) are exceeded is considered to comply with this requirement.

– Consideration should be given to any scenario that can expose any permitted flammable liquid to a temperature that could exceed t_a – 100 ° C, where t_a is the auto-ignition temperature.

– The use of a flammable liquid not approved by the manufacturer for use in the equipment is not considered as an OPERATOR setting and is therefore beyond the evaluation of Clause 16.

NOTE 101 Guidance on what is considered REASONABLY FORESEEABLE MISUSE is provided in 16.1.

It is not sufficient to limit the surface temperature of the flammable liquid and parts in contact with the surface solely by the temperature control system. Overtemperature protection meeting the requirements of 10.101 achieved by an independent, adjustable temperature-limiting device shall be used.

NOTE 102 The surface temperature of the heating device used to heat a liquid can be considerably higher than the temperature of the liquid.

NOTE 103 Additional instructions for equipment intended for use with flammable liquid HEAT TRANSFER MEDIUM are detailed in 5.4.101.

Addition:

Add the following note after item c):

NOTE 104 Where flammable liquid is present in the equipment, symbol 101 can be used as a warning marking.

Replacement:

Replace the first paragraph of the conformity statement by the following:

Conformity is checked by inspection, including nameplate, documentation and function of the equipment and, if necessary, by the tests and measurements of temperature as specified in 10.4 and 10.101.

10 Equipment temperature limits and resistance to heat

This clause of Part 1 is applicable except as follows:

10.1 Surface temperature limits for protection against burns

Replacement:

Replace the first sentence of the third paragraph with the following text:

If easily touched heated surfaces are necessary for functional reasons, whether because they are intended to deliver heat or are hot because of proximity to heating parts, they are permitted to exceed the values of Table 19 in NORMAL CONDITION and to exceed 105 °C in SINGLE FAULT CONDITION, provided that they are recognizable as such by appearance or function or are marked with symbol 13 of Table 1 (see 5.2).

Addition:

Add the following new subclause:

10.101 Overtemperature protection

If a single fault in a temperature control system, heater, cooling means, circulating pump or fan, agitator, or other part could cause a HAZARD through overheating of any part of equipment, a non-self-resetting