IEC 61010-2-010

Edition 3.0 2014-09

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 2-010: Particular requirements for laboratory equipment for the heating of materials

Règles 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

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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

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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 third edition cancels and replaces the second edition published in 2003. It constitutes a technical revision and includes the following significant changes from the second edition, as well as numerous other changes:

- added a definition for HEAT TRANSFER MEDIUM to Clause 3;
- added a symbol for FLAMMABLE LIQUID to Table 1 in Clause 5;
- added a requirement for instructions pertaining to ventilation in Clause 5;
- modified the requirements for humidity preconditioning in Clause 6;

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- added requirements for equipment containing or using flammable liquids to Clause 9;
- added requirements for over-temperature protection devices to Clause 10.

The text of this standard is based on the following documents:

FDIS	Report on voting
66/532/FDIS	66/543/RVD

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

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

A list of all parts of the IEC 61010 series, under the general title: *Safety requirements for electrical equipment for measurement, control, and laboratory use*, may be found on the IEC website.

This Part 2-010 is intended to be used in conjunction with IEC 61010-1. It was established on the basis of the third edition (2010).

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

Where a particular subclause of Part 1 is not mentioned in this Part 2, that subclause applies as far as is reasonable. Where this part 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.

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

Part 2-010: Particular requirements for laboratory equipment for the heating of materials

Withdrawn

1 Scope and object

This clause of Part 1 is applicable except as follows:

1.1.1 Equipment included in scope

Replacement:

This part of IEC 61010 specifies safety requirements for electrically powered laboratory equipment for the heating of materials, where the heating of materials is one of the functions of the equipment.

NOTE If 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 will also need to meet the requirements of those other part 2 standards. In particular, if equipmen is intended to be used for IVD purposes, it will need to meet the requirements of IEC 61010-2-101.

1.1.2 Equipment excluded from scope

Addition after item j):

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:

ISO 7010:2011, *Graphical symbols — Safety colours and safety signs — Registered safety signs*

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

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4 Tests

This clause of Part 1 is applicable except as follows:

4.4.2.11 Heating devices

Addition:

If a HAZARD could be caused by overfilling or under-filling with a liquid HEAT TRANSFER MEDIUM, the equipment shall be tested when 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 Marking

Table 1 – Symbols

Addition:

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

5.1.3 MAINS supply

Addition to 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.

5.1.6 Switches and circuit-breakers

Addition:

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.

5.2 Warning markings

Replacement of the first paragraph by the following:

Warning markings specified in 5.1.5.2 c), 5.2.101, 6.1.2 b), 6.1.2.101 2), 7.3.2 b) 3), 7.4, 10.1, 9.5 c), and 13.2.2 shall meet the following requirements:

Additional subclause:

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5.2.101 Equipment with high ACCESSIBLE current

If the ACCESSIBLE current of the equipment exceeds the limit of 6.3.1 b) or 6.3.2 b) for non-permanently connected equipment, but is within the limit for PERMANENTLY CONNECTED EQUIPMENT, there shall be a warning marking requiring permanent connection to the supply source. The marking shall be on or beside the cover of the TERMINALS for connection to the supply source, and the warning shall be repeated in the installation instructions. Symbol 14 of Table 1 is an adequate warning marking, particularly when it may not be known in which country the equipment will be used and, therefore, in which language it would be appropriate to print the warning marking.

Conformity is checked by inspection.

5.4.3 Equipment installation

Replacement:

The documentation shall include installation and specific commissioning instructions (examples are listed below) and, if necessary for safety, warnings against HAZARDS which could arise during installation or commissioning of the equipment:

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, including the warning and statement which are necessary when permanent connection to the supply source is essential (see 5.2.101), 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 6.11.2.1) 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 for special services, for example, air, 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, etc. (also see the note to 5.4.1).

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

Conformity is checked by inspection.

Additional 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 standard, the installation instructions shall specify a period of operation

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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 standard during the drying-out process.

Conformity is checked by inspection.

5.4.4 Equipment operation

Addition at the end of item g):

(see 5.4.4.101)

Addition 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 (also see 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.

Additional 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 his 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 national 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 format 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:

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

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

6 Protection against electric shock

This clause of Part 1 is applicable except as follows:

6.1 General

6.1.1

Addition 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 operator manual (see 5.4.3.101) before making the measurements of 6.3. Drying-out is followed by a rest period of 2h, 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 maximum operating temperature, the relevant measurements are repeated at maximum operating temperature and the higher values are used.

Additional 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 operating 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 those of the following conditions that are 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 the following:

   i) insulated TOOLS;

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ii) insulating clothing;

iii) 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 b) 1) Current

Addition:

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

6.3.2 b) 1) Current

Addition:

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

6.7.2.2 Solid insulation

Additional 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 providing the operator 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:

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 whether the equipment would pass a particular test at maximum operating temperature, then that test is repeated at maximum operating temperature.

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

6.9.2 Insulating materials

Addition 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

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