IEC 61010-2-130

Edition 1.0 2021-03

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Safety requirements for electrical equipment for measurement, control, and laboratory use –
Part 2-130: Particular requirements for equipment intended to be used in educational establishments by children

Exigences de sécurité pour appareils électriques de mesurage, de régulation et de laboratoire –
Partie 2-130: Exigences particulières pour appareils destinés à une utilisation dans les établissements scolaires par des enfants:

IEC 61010-2-130:2021-03(en-fr)

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IEC Central Office
3, rue de Varembé
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

Part 2-130: Particular requirements for equipment intended to be used in educational establishments by children

FOREWORD

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International Standard IEC 61010-2-130 has been prepared by IEC Technical Committee 66: Safety of measuring, control and laboratory equipment.

This first edition cancels and replaces IEC TS 62850, published in 2013.

This edition includes the following significant technical changes with respect to IEC TS 62850:

a) marking and documentation requirements;
b) stability and handling requirements.

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

FDIS	Report on voting
66/724/FDIS	66/726/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 and taking into account ISO/IEC Guide 50:2014.

A list of all parts in 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 document is to be used in conjunction with IEC 61010-1. It was established based on the third edition (2010) of IEC 61010-1, including its Amendment 1 (2016) hereinafter referred to as Part 1.

This document supplements or modifies the corresponding clauses in IEC 61010-1 to convert that publication into the IEC standard: *Particular requirements for equipment intended to be used in educational establishments by children*.

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

In this standard, the following print types are used:

- requirements: in roman type;
- NOTES: in smaller roman type;
- *conformity assessment and test: in italic type*;
- terms defined used throughout this standard which have been defined in Clause 3: SMALL ROMAN CAPITALS.

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 and additional list items are lettered 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,
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INTRODUCTION

This document specifies particular safety requirements for equipment and accessories intended to be used in educational establishment by PUPIL OPERATORS. PUPIL OPERATORS are for the sake of this document, children between the ages of 3 years and 16 years operating electrical equipment under supervision of a RESPONSIBLE BODY.

Equipment and accessories are considered intended for use in educational establishments, when it is either explicitly stated in accompanying documentation, or where sales and marketing materials indicate such intended use. This does not limit the use of other equipment for use in educational establishments, however equipment and accessories not evaluated to the requirements of this document may need additional precautions and attestation when used by PUPIL OPERATORS.

Readily predictable behaviour of PUPIL OPERATORS can include poking objects and materials associated with equipment and accessories, which poses additional challenges for determination of reasonably foreseeable misuse. Consequently, more stringent criteria for access to potentially hazardous parts are required for educational establishment equipment than for general laboratory use.

Moreover, the maximum temperatures of parts that may be touched by children should be lower than for equipment handled only by adults. Ergonomic considerations and mechanical risks need to be addressed with regard to the anthropomorphic dimensions of children instead of adults.

This document includes the following significant changes with respect to Part 1, as well as other changes:

a) a marking is added to indicate to the RESPONSIBLE BODY that the equipment is intended to be used by PUPIL OPERATORS under supervision;

b) accessibility requirements are enhanced to take into account the propensity of children to insert foreign objects wherever they can;

c) temperature limits have been decreased to take into account the greater sensitivity of a child's skin;

d) mechanical access dimensions have been reduced to take into account the smaller dimensions of a child's body;

e) limits for non-collimated optical radiation have been introduced;

f) limits for ionizing radiation have been reduced;

g) small detachable parts below certain dimensions have been prohibited;

h) manufacturers are required to consider the general unpredictability of the behaviour of PUPIL OPERATORS.

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

Part 2-130: Particular requirements for equipment intended to be used in educational establishments by children

1 Scope and object

This clause of Part 1 is applicable except as follows:

1.1.1 Equipment included in scope

Deletion: Delete paragraph 1.

Replacement:

Replace the second paragraph immediately before the lettered list, with the following:

This part of IEC 61010 specifies particular safety requirements for the following types of equipment a), b) or c) and their accessories intended to be used in educational establishments by children under the supervision of the RESPONSIBLE BODY. It specifies general safety requirements for equipment intended to be used in educational establishments by persons between the age of 3 years and the age of 16 years under the supervision of a RESPONSIBLE BODY.

Children are considered as persons between the age of 3 years and 16 years.

It is recognized that pupils with additional educational or physical support needs may have needs beyond the level addressed in this document (see Clause 17 risk assessment).

NOTE 1 The term "children" used in this document does not match the definitions found in ISO/IEC Guide 50 and other documents.

It is possible that all or part of the equipment falls within the scope of one or more IEC 61010 Part 2 standards as well as within the scope of this document. In that case the requirements of those other Part 2 standards apply.

NOTE 2 In some countries, age limits can be different from those used in this document or can be replaced by capability requirements.

Renumber the existing NOTE 1 and NOTE 2 as NOTE 3 and NOTE 4.

1.1.3 Computing equipment

Renumber NOTE as NOTE 1.

Addition:

Add the following note after the existing note.

NOTE 2 General information technology equipment such as projector, tablet PC, monitor, electronic whiteboard, power supplies, etc. used by children in an educational establishment are excluded from the scope unless those are specifically designed for the type of equipment covered under the scope of IEC 61010-1 or any of its Part 2 standards.

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1.2.1 Aspects included in scope

Replace the existing note by the following notes:

NOTE 1 Attention is drawn to the additional requirements that can be specified by national authorities responsible for health and safety in education. In particular, there can be limitations on the use of radioactive materials, X-ray and laser equipment and hazardous substances.

NOTE 2 Attention is also drawn to the existence of additional requirements that can be specified by national authorities responsible for the health and safety of children in education with special needs.

2 Normative references

This clause of Part 1 is applicable except as follows:

Delete:

IEC 61010-031, *Safety requirements for electrical equipment for measurement, control and laboratory use – Part 031: Safety requirements for hand-held probe assemblies for electrical measurement and test*

3 Terms and definitions

This clause of Part 1 is applicable except as follows:

3.5.11
OPERATOR

After the definition, add the note:

Note 1 to entry: Within this document, the term "OPERATOR" indicates either an adult OPERATOR or a PUPIL OPERATOR, unless otherwise specified.

3.5.14
REASONABLY FORESEEABLE MISUSE

Add the note:

Note 1 to entry: The age of the child will affect the predictability of the behaviour.

Add the following new term entry:

3.5.101
PUPIL OPERATOR
child receiving education in an educational establishment under the supervision of the RESPONSIBLE BODY

4 Tests

This clause of Part 1 is applicable except as follows:

4.3.2 State of equipment

This subclause of Part 1 is applicable except as follows:

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4.3.2.8 Controls

Replace the existing text with the following:

Controls which an OPERATOR can adjust without the use of a TOOL shall be set to any position.

4.4 Testing in SINGLE FAULT CONDITION

This subclause of Part 1 is applicable except as follows:

4.4.2.1 General

Replace the existing NOTE with the following:

For example, fans may be stopped one fan at a time unless they share a common power or control source. In that case, the common fans shall be stopped simultaneously by interrupting the power or control source.

5 Marking and documentation

This clause of Part 1 is applicable except as follows:

5.1.1 General

Replace the third paragraph with the following:

Letter symbols for quantities and units shall be as specified in IEC 60027 (all parts). Graphic symbols, if applicable, shall be in accordance with Table 1. There are no colour requirements for symbols. Symbol 101 of Table 1, including the example age limit: '≥ 11', shall be:

a) included in the instructions,

and

b) marked on the product or provided on a label for the RESPONSIBLE BODY to apply as instructed. The durability test does not apply to symbol 101 marking.

Graphic symbols shall be explained in the documentation.

NOTE The purpose of symbol 101 is to assist the RESPONSIBLE BODY when making its risk assessment.

5.1.3 MAINS supply

Replace existing text of list item d) with the following:

d) Equipment which an OPERATOR can set for different RATED supply voltages shall be provided with means for the indication of the voltage for which the equipment is set. For PORTABLE EQUIPMENT the indication shall be visible from the exterior.

Replace Table 1 with the following:

(Row 101 and footnote b have been added)

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Table 1 – Symbols

Number	Symbol	Reference	Description
1		IEC 60417-5031 (2002-10)	Direct current
2		IEC 60417-5032 (2002-10)	Alternating current
3		IEC 60417-5033 (2002-10)	Both direct and alternating current
4	3	IEC 60417-5032-1 (2002-10)	Three-phase alternating current
5		IEC 60417-5017 (2006-08)	Earth (ground) terminal
6		IEC 60417-5019 (2006-08)	Protective conductor terminal
7		IEC 60417-5020 (2002-10)	Frame or chassis terminal
8			Not used
9		IEC 60417-5007 (2002-10)	On (Power)
10		IEC 60417-5008 (2002-10)	Off (Power)
11		IEC 60417-5172 (2003-02)	Equipment protected throughout by double insulation or reinforced insulation
12		IEC 60417-6042 (2010-11)	Caution, risk of electric shock
13		IEC 60417-5041 (2002-10)	Caution, hot surface
14		ISO 7000-0434B (2004-01)	Caution [a]
15		IEC 60417-5268 (2002-10)	"IN" position of a bi-stable push control
16		IEC 60417-5269 (2002-10)	"OUT" position of a bi-stable push control
17		ISO 361	Ionizing radiation
101	≥11	IEC 60417-6147	Intended for use in educational establishments by PUPIL OPERATORS at least 11 years old under supervision of the RESPONSIBLE BODY [b]

[a] See 5.4.1 which requires manufacturers to state that documentation must be consulted in all cases where this symbol is marked.

[b] The number 11 is an example age. Other numbers can be marked for other ages. The number shall be at least 1,5 mm high.

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5.1.5.2 Terminals

Renumber NOTE to NOTE 1.

Addition:

After NOTE 1 add the note:

NOTE 2 In some countries, PUPIL OPERATORS are not permitted access to HAZARDOUS LIVE parts, except if they are undergoing technical training, when they might have the same access as an adult OPERATOR provided that they are under supervision of the RESPONSIBLE BODY.

5.2 Warning markings

Add the following note before the last paragraph beginning "Symbols are the preferred..." (before the conformity statement):

NOTE In some countries, PUPIL OPERATORS may not be allowed access to HAZARDOUS LIVE parts, except if they are undergoing technical training, when they might have the same access as an adult OPERATOR provided that they are under supervision of the RESPONSIBLE BODY.

5.4.1 General

Replace list item a) with the following:

a) intended use of the equipment, including a statement of the minimum age for which the equipment is used under supervision, for example "This equipment is suitable for use in educational establishments by students at least 11 years old when supervised", and any additional information regarding suitability for use by PUPIL OPERATORS in education with special needs;

Add the following new item after existing list item h):

aa) for experimental kits or sets of components, the instructions shall point out possible hazards and give technical information concerning the parts, their behaviour and how to handle them properly. All hazards that can be expected during an experiment, for example such as those from short-circuiting or reverse connection of batteries or capacitors, shall be described in detail.

NOTE Experimental kits or set of components are the collection of electric, electronic or mechanical components intended to be assembled by children in various combinations to demonstrate physical phenomena or other functions.

5.4.3 Equipment installation

Add the following new list item:

aa) instructions that installation which could cause a risk of harm must not be carried out by a PUPIL OPERATOR.

5.4.4 Equipment operation

Add the following new list item and new paragraph after it:

aa) a statement that, to protect against eye injuries, laser sources classified as Class 2 according to IEC 60825-1 must be stable or fixed in place where necessary to prevent accidental movement.

The instructions shall specify which operations are required to be carried out by the RESPONSIBLE BODY before the equipment is subsequently used by PUPIL OPERATORS. Manufacturer's instructions shall include the statement that routine maintenance and visual inspection of the equipment is required to be carried out by the RESPONSIBLE BODY before use.

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Replace the existing second paragraph with the following:

If equipment within the scope of IEC 60950-1 or IEC 62368-1 is used with equipment within the scope of this document, and if there is a HAZARD due to moisture or liquids, the instructions for use shall specify any additional precautions necessary.

5.4.5 Equipment maintenance and service

Add the following new text after the 5th paragraph:

The manufacturer's instructions shall state that maintenance shall not be conducted by any PUPIL OPERATOR, including replacement of batteries, fuses, or lamps. An exception can be made for equipment intended for PUPIL OPERATORS aged 11 years or older using commercially available sealed batteries replaceable without a TOOL.

6 Protection against electric shock

This clause of Part 1 is applicable except as follows:

6.1.2 Exceptions

Add a note before the conformity statement:

NOTE Attention is drawn to the possible existence of national or other authorities' limitations for access to HAZARDOUS LIVE parts by PUPIL OPERATORS.

6.2.1 General

Replace the first sentence in the first paragraph with the following:

Unless obvious, determination of whether a part is ACCESSIBLE is made as specified in 6.2.2 and 6.2.101 in all positions of NORMAL USE.

Replace the second paragraph with:

If, in NORMAL USE, an OPERATOR is intended to perform any actions (with or without a TOOL) that could increase the accessibility of parts, such actions are taken before performing the examinations of 6.2.2 and 6.2.101.

Replace the last paragraph with the following:

Rack-mounted and panel-mounted equipment is installed as specified in the manufacturer's instructions before making the examinations of 6.2.2 and 6.2.101. For such equipment, the OPERATOR is assumed to be in front of the panel.

6.2.2 Examination

Replace the text "(see Figure B.2)" with the following:

(see Figure B.101)

6.2.3 Openings above parts that are HAZARDOUS LIVE

Delete Subclause 6.2.3.

6.2.4 Openings for pre-set controls

Delete Subclause 6.2.4.

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Add the following new subclause:

6.2.101 Enclosure openings

For all openings and TERMINALS, *a mild steel access probe, 100 mm long and 1 mm in diameter, is inserted up to its full length into all openings up to a maximum force of 1 N. The access probe shall maintain at least* BASIC INSULATION CLEARANCE *from* HAZARDOUS LIVE *parts. For* FIXED EQUIPMENT, *or equipment with a weight above 18 kg and feet shorter than 50 mm, the access probe is not inserted into openings in the bottom of the equipment.*

NOTE This access probe simulates an opened-out paper clip.

6.3.2 Levels in SINGLE FAULT CONDITION

Add the following before the first paragraph:

For equipment intended for PUPIL OPERATORS ≤ 11 years of age, the voltage levels in SINGLE FAULT CONDITION shall not exceed those of 6.3.1 a).

6.8.3.1 The a.c. voltage test

Replace the first sentence with the following sentence:

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

7 Protection against mechanical HAZARDS

This clause of Part 1 is applicable except as follows:

7.3 Moving parts

7.3.1 General

Add the following sentence after the existing first paragraph:

The evaluation of the possibility to avoid the hazard and the interpretation of minimum protective levels A, B and C shall consider the physical and behavioral characteristics of children according to ISO/IEC Guide 50.

7.3.2 Exceptions

Replacement:

Replace list item b) 2) with:

2) the instructions for the RESPONSIBLE BODY include a statement that OPERATORS must be trained before being allowed to perform the hazardous operation and that PUPIL OPERATORS are not permitted to perform routine maintenance outside NORMAL USE.

7.3.3 RISK assessment for mechanical HAZARDS to body parts

Replace the first existing paragraph with:

RISKS shall be reduced to a tolerable level for users and PUPIL OPERATORS aged 14 years and above by at least the applicable minimum protective measure of Table 12, taking into account the severity, probability of exposure and possibility of avoiding the HAZARD.

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For PUPIL OPERATORS less than 14 years of age, an additional RISK assessment in accordance with Clause 17 shall be conducted to assess whether risks have been reduced to a tolerable level for these children.

NOTE The minimum age of the PUPIL OPERATOR is marked on the equipment, see 5.1.1 and symbol 101 of Table 1.

7.3.5.2 Gap limitations between moving parts – Access normally prevented

Replace the existing first paragraph with the following:

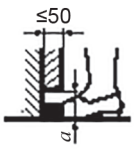
While parts are moving, gaps between moving parts into which body parts could be inserted shall:

a) not increase to more than the acceptable gap of Table 14 for PUPIL OPERATORS aged 14 years and above in NORMAL CONDITION and SINGLE-FAULT CONDITION, and

b) conform to Table 101 for PUPIL OPERATORS aged 3 years to 13 years in NORMAL CONDITION and SINGLE-FAULT CONDITION. For irregular openings, refer to 7.3.5.101.

Replace the title of Table 13 and delete the text in the final row, as follows:

Table 13 – Minimum maintained gaps to prevent crushing for different body parts for adults and PUPIL OPERATORS aged 3 years and above

Part of body	Minimum gap (*a*) to avoid crushing mm	Illustration
Torso	500	IEC
Head	300	IEC
Leg	180	IEC
Foot	120	IEC
Toes	50	 IEC

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Part of body	Minimum gap (*a*) to avoid crushing mm	Illustration
Arm	120	IEC
Hand, wrist, fist	100	IEC
Finger	25	IEC

Replace the title and row 5 of Table 14 as follows:

Table 14 – Maximum gaps to prevent access for different body parts for adults and PUPIL OPERATORS aged 14 years and above

Part of body	Maximum Gap (*a*) [a] to prevent access mm
Head	120
Foot	35
Finger	4
[a] See Table 13 for examples of gap (*a*).	

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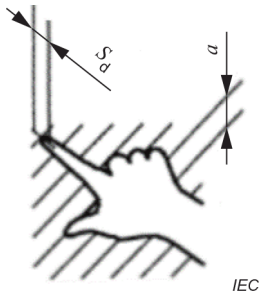
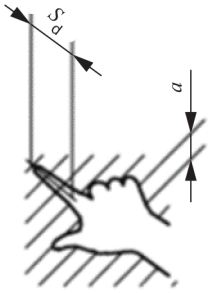
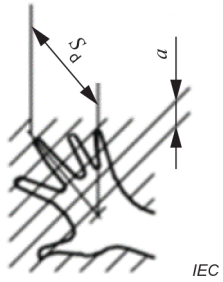
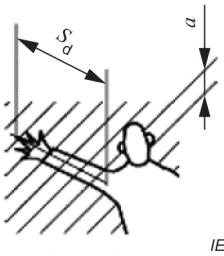
Add the following new table after Table 14:

Table 101 – Minimum safety distances to limit access for different body parts for PUPIL OPERATORS aged 3 years to 13 years

Part of body	Illustration	Opening, a	Safety distance, S_d		
		(mm)	(mm)		
			Slot	Square	Round
Fingertip		$a \leq 4$	≥ 2	≥ 2	≥ 2
		$4 < a \leq 6$	≥ 20	≥ 10	≥ 10
Finger up to knuckle joint		$6 < a \leq 8$	≥ 40	≥ 30	≥ 20
		$8 < a \leq 10$	≥ 80	≥ 60	≥ 60
		$10 < a \leq 12$	≥ 100	≥ 80	≥ 80
Hand		$12 < a \leq 20$	≥ 900 [a]	≥ 120	≥ 120
Arm up to junction with shoulder		$20 < a \leq 30$	≥ 900	≥ 550	≥ 120
		$30 < a \leq 100$	≥ 900	≥ 900	≥ 900

NOTE This Table 101 gives safety distances to hazard zones, "S_d" for regular openings for PUPIL OPERATORS aged 3 years to 13 years. The dimension of the opening, "a" corresponds to the side of a square opening, the diameter of a round opening and narrowest dimension of a slot opening. These distances are derived from ISO 13857.

[a] If the length of the slot opening is ≤ 40 mm, the thumb will act as a stop and the safety distance will be reduced to 120 mm.

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