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- i) has any issues related to 3rd party IPR, patent or copyright
- ii) affects other national standard(s)
- iii) requires additional national guidance or information

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This draft is issued to allow comments from interested parties; all comments will be given consideration prior to publication. No acknowledgement will normally be sent. **See overleaf for information on the submission of comments.**

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Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

For national standards, comments will be reviewed by the relevant UK national committee and the resulting standards published as a British Standard.

UK Vote

Please indicate whether you consider the UK should submit a negative (with supporting technical reasons) or positive vote on this draft. Please indicate if you are aware of any reason why this draft standard should not be published as a British Standard.

Submission of Comments

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Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/ Figure/Table/Note	Type of comment	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	



66/844/CD

COMMITTEE DRAFT (CD)

PROJECT NUMBER: IEC 61010-2-034 ED3	
DATE OF CIRCULATION: 2025-03-07	CLOSING DATE FOR COMMENTS: 2025-05-02
SUPERSEDES DOCUMENTS: 66/840/RR	

IEC TC 66 : SAFETY OF MEASURING, CONTROL AND LABORATORY EQUIPMENT	
SECRETARIAT: United Kingdom	SECRETARY: Ms Stephanie Lavy
OF INTEREST TO THE FOLLOWING COMMITTEES: TC 42, TC 85	HORIZONTAL FUNCTION(S): TC 66 Horizontal Group Safety
ASPECTS CONCERNED: Safety	

This document is still under study and subject to change. It should not be used for reference purposes.

Recipients of this document are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

Recipients of this document are invited to submit, with their comments, notification of any local regulations or technical reasons that may exist and should be considered should this proposal proceed, recognizing that failure to address such requirements could result in the need for new or existing "In Some Countries" clauses. (SEE [AC/22/2007](#) OR [NEW GUIDANCE DOC](#)).

TITLE:
Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 2-034: Particular requirements for measurement equipment for insulation resistance and test equipment for electric strength

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**SAFETY REQUIREMENTS FOR ELECTRICAL EQUIPMENT
FOR MEASUREMENT, CONTROL, AND LABORATORY USE –****Part 2-034: Particular requirements for measurement equipment
for insulation resistance and test equipment for electric strength**

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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IEC 61010-2-034 has been prepared by IEC technical committee 66: Safety of measuring, control and laboratory equipment. It is an International Standard.

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 2023. This edition constitutes a technical revision.

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

- a) IEC 61010-2-130 has been considered relevant to this document;
- b) added a definition for MEASURING CIRCUITS;
- c) impact of amendment 2 to IEC 61010-1:2010/AMD1/2016 has been taken into consideration:
 - 1) Clause 2 and Bibliography have been updated;

- 2) MAINS definition has been modified
- 3) in 4.3.2.5, specific requirements for power supply have been deleted since Amendment 2 of IEC 61010 1 take them now into account;
- 4) Figure 101 is replaced by Figure 3;
- 5) modifications of 6.8.3.1 and 6.8.3.2 have been deleted since Amendment 2 of IEC 61010 1 take them now into account;
- 6) conformity statements of K.3.2 and K.101.2 have been modified;
- 7) a few conformity statements for constructional requirements of solid insulation have been modified;
- d) in 4.4.2.101, requirements for surge protective devices have been modified;
- e) 5.101 has been moved to 6.103 as this subclause is relevant to prevention of electric shock;
- f) in 6.3.2 c), level for inductive stored energy has been added;
- g) 6.5.2.101 has been deleted;
- h) 6.5.5 has been modified to take into account the automatic disconnection of HAZARDOUS LIVE voltage source
- i) 6.5.6 has been modified to take into account voltage-limiting devices used in MEASURING CIRCUITS;
- j) in 6.6.101.1, a new requirement for TERMINALS is added;
- k) in 6.6.101.2, the conformity statement has been modified;
- l) in 6.8.1, a precision is given when testing solid insulation;
- m) 6.101.3 has been completed for clarification;
- n) 9.101.1 and 9.101.2.1 have been redrafted for clarification, in particular to take into account the recommendations of new Annex N about REASONABLY FORESEEABLE MISUSE;
- o) a new 14.9 with requirements for capacitors has been added;
- p) precisions for probe assemblies used to inject voltage have been given in 14.101;
- q) Clause 101 has been rephrased and completed with requirements for equipment injecting current;
- 1) 101.2 has been moved to 9.101.6 as this subclause is relevant for prevention of fire;
- 2) 101.3 has been moved to 16.4 and 16.101.

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

Draft	Report on voting
66/xxx/FDIS	66/xxx/RVD

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

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

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*, can be found on the IEC website.

This document is to be used in conjunction with IEC 61010-1:2010, IEC 61010-1:2010/AMD1:2016 and IEC 61010-1:2010/AMD2:—¹.

This document supplements or modifies the corresponding clauses in IEC 61010-1 so as to convert that publication into the IEC standard: *Particular requirements for measurement equipment for insulation resistance and test equipment for electric strength*.

Where a particular subclause of IEC 61010-1 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 IEC 61010-1 should be adapted accordingly.

In this standard:

- the following print types are used:
 - requirements: in roman type;
 - NOTES: in small roman type;
 - *conformity and tests: in italic type*;
 - terms 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 IEC 61010-1 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 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 document 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.

¹ Second amendment under preparation. Stage at the time of publication: IEC CDV 61010-1/12:2025.

INTRODUCTION

IEC 61010-1 specifies the safety requirements that are generally applicable to all equipment within its scope. For certain types of equipment, the requirements of IEC 61010-1 and its amendments will be supplemented or modified by the special requirements of one or more standard from the IEC 61010-2 series which is/are read in conjunction with the requirements of IEC 61010-1.

1) IEC 61010-2-030 specifies the safety requirements for equipment with testing or measuring circuits which are connected for test or measurement purposes to devices or circuits outside the measurement equipment itself.

2) IEC 61010-2-032 specifies the safety requirements for hand-held and hand-manipulated current sensors for measuring, detecting or injecting current, or indicating current waveforms on circuits without physically opening the current path of the circuit being measured, included clamp multimeters.

Most of the requirements of IEC 61010-2-030 have been included in IEC 61010-2-032. Equipment within the scopes of both IEC 61010-2-030 and IEC 61010-2-032 are considered to be covered by the requirements of IEC 61010-2-032.

However, for current sensors in combined equipment with PROTECTIVE BONDING and automatic disconnection of the supply, IEC 61010-2-030 and IEC 61010-2-032 are read in conjunction.

3) IEC 61010-2-033 specifies the safety requirements for hand-held multimeters **and other meters** for domestic and professional use, capable of measuring MAINS voltage, intended to measure voltage and other electrical quantities such as resistance or current.

All relevant requirements of IEC 61010-2-030 have been included in IEC 61010-2-033.

4) This document specifies the safety requirements for measurement equipment for insulation resistance and test equipment for electric strength which are connected to units, lines or circuits for test or measurement purposes.

All relevant requirements of IEC 61010-2-030 have been included in this document. However, for equipment within the scope of IEC 61010-2-032 and of this document, these standards are read in conjunction.

IEC 61010-031 specifies the safety requirements for hand-held and hand-manipulated probe assemblies and their related accessories intended to be used in particular with equipment in the scope of IEC 61010-2-030, IEC 61010-2-032, IEC 61010-2-033 and this document. These probe assemblies are for non-contact or direct electrical connection between a part and electrical test and measurement equipment. They may be fixed to the equipment or be detachable accessories for the equipment.

IEC 61010-2-130 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 IEC 61010-2-130, children between the ages of 3 years and 16 years operating electrical equipment under supervision of a RESPONSIBLE BODY. For equipment used in educational establishments, the requirements of IEC 61010-2-130 will supplement or modify the requirements of this document.

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

Part 2-034: Particular requirements for measurement equipment for insulation resistance and test equipment for electric strength

All Clauses and their subclauses, all Annexes, their Clauses and subclauses, and Bibliography of IEC 61010-1:2010+AMD1:2016+AMD2:—² apply except as follows.

1.1.1 Equipment included in scope

Replace the existing text with the following new text:

This document specifies safety requirements to equipment for measuring insulation resistance and to equipment for testing electric strength which have an output voltage exceeding 50 V a.c. or 120 V d.c.

This document also applies to combined measuring equipment which has an insulation resistance measurement function or an electric strength test measurement function.

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

One of the responsibilities of a technical committee is, wherever applicable, to make use of basic safety publications and/or group safety publications in the preparation of its publications.

1.1.2 Equipment excluded from scope

Add the following two new items after item h) of the list:

- aa) IEC 61557-8 (Electrical safety in low voltage distribution systems up to 1 000 V a.c. and 1 500 V d.c. – Equipment for testing, measuring or monitoring of protective measures – Part 8: Insulation monitoring devices for IT systems);
- bb) IEC 61557-9 (Electrical safety in low voltage distribution systems up to 1 000 V a.c. and 1 500 V d.c. – Equipment for testing, measuring or monitoring of protective measures – Part 9: Equipment for insulation fault location in IT systems).

² Second amendment under preparation. Stage at the time of publication: IEC CDV 61010-1/12:2025.

1.2.1 Aspects included in scope

Replace item c) and item h) from the list of the second paragraph with the following new item c) and item h):

c) spread of fire or arc flash from the equipment (see Clause 9);

h) HAZARDS related to the use and REASONABLY FORESEEABLE MISUSE of the equipment (see Clause 16 and Clause 101).

Insert the following new paragraph between the third paragraph and the Note:

Annex BB provides guidance to equipment manufacturers on HAZARDS that should be considered for equipment intended for performing tests and measurements on hazardous conductors, including MAINS conductors and telecommunication network conductors.

2 Normative references

Replace the following two existing normative references:

IEC 61672-1, *Electroacoustics – Sound level meters – Part 1: Specifications*

IEC 61672-2, *Electroacoustics – Sound level meters – Part 2: Pattern evaluation tests*

with the following new normative references:

IEC 61672-1:2013, *Electroacoustics – Sound level meters – Part 1: Specifications*

IEC 61672-2:2013, *Electroacoustics – Sound level meters – Part 2: Pattern evaluation tests*

IEC 61672-2:2013/AMD1:2017

Insert the following five new normative references in alphanumeric order:

IEC 60364-4-44:2007, *Low-voltage electrical installations – Part 4-44: Protection for safety – Protection against voltage disturbances and electromagnetic disturbances*

IEC 60364-4-44:2007/AMD1:2015

IEC 60364-4-44:2007/AMD2:2018

IEC 61000-4-5:2014, *Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques – Surge immunity test*

IEC 61000-4-5:2014/AMD1:2017

IEC 61010-1:2010, *Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 1: General requirements*

IEC 61010-1:2010/AMD1:2016

IEC 61010-1:2010/AMD2:—³

³ Second amendment under preparation. Stage at the time of publication: IEC CDV 61010-1/12:2025.

292 IEC 61010-2-032, *Safety requirements for electrical equipment for measurement, control, and*
293 *laboratory use – Part 2-032: Particular requirements for hand-held and hand-manipulated*
294 *current sensors for electrical test and measurement*

295 IEC 61010-031:2022, *Safety requirements for electrical equipment for measurement, control and*
296 *laboratory use – Part 031: Safety requirements for hand-held probe assemblies for electrical*
297 *measurement and test*

298

299 **3.5 Safety terms**

300 *Replace the definition of 3.5.6 with the following new definition:*

301 **3.5.6**

302 **MAINS**

303 a.c or d.c. electrical power distribution system (external to the equipment)

304 NOTE 1 to entry: MAINS include public or private electrical utilities and, unless otherwise specified in this document,
305 equivalent sources such as motor-driven generators and uninterruptible power supplies.

306 NOTE 2 to entry: This definition differs from the IEC 61010-1/A2 definition by allowing voltages greater than 1 000 V
307 a.c. and 1 500 V d.c. and can be used to power the equipment or be measured.

308 [IEC 60664-1:2020, 3.1.2 (mains supply) modified]

309

310 *Insert the following two new terms and definitions between the existing terms 3.5.7 and 3.5.8:*

311 **3.5.101**

312 **MEASURING CIRCUIT**

313 testing or measuring circuit (internal to the equipment) which is connected for test or
314 measurement purposes to devices or circuits outside the equipment itself

315 **3.5.102**

316 **MEASUREMENT CATEGORY**

317 classification of MEASURING CIRCUITS according to the type of MAINS to which they are intended
318 to be connected

319

320 **4.3.2.6 Input and output voltages**

321 *Replace the existing title and text of 4.3.2.6 with the following new text and title:*

322 **4.3.2.6 Input and output voltages or currents**

323 Input and output voltages or currents, including floating voltages but excluding the electrical
324 supply voltage (see 4.3.2.5), shall be set to any voltage or current within their RATED range, in
325 normal and reverse polarity if possible.

326

327 **4.4.2.1 General**

328 *Replace the item 2) of the first paragraph with the following new item 2):*

2) Applicable fault conditions specified in 4.4.2.2 to 4.4.2.15 and 4.4.2.101.

Add the following new subclause after 4.4.2.15:

4.4.2.101 Surge protective devices

Surge protective devices used in MAINS CIRCUITS or MEASURING CIRCUITS connected to MAINS shall be short-circuited and open-circuited, only one at a time in turn in any convenient order.

Add the following new subclause after 5.1.5.2:

5.1.5.101 MEASURING CIRCUIT TERMINALS

5.1.5.101.1 General

Some MEASURING CIRCUIT TERMINALS for the equipment within the scope of this document also serve as output TERMINALS.

Except as permitted in 5.1.5.101.5:

- a) the value of the nominal a.c. r.m.s. line-to-neutral or d.c. voltage of MAINS being measured shall be marked for MEASURING CIRCUIT TERMINALS RATED for MEASUREMENT CATEGORIES, or the value of the RATED voltage to earth for other MEASURING CIRCUIT TERMINALS, and

NOTE CLEARANCES and solid insulation for MEASUREMENT CATEGORIES are specified for a nominal a.c. r.m.s. line-to-neutral or d.c. voltage of MAINS being measured. Neutral is considered to be earthed (see Annex I).

- b) the value of the RATED voltage or the RATED current, as applicable, of each pair or set of MEASURING CIRCUIT TERMINALS that are intended to be used together shall be marked, and
- c) the pertinent MEASUREMENT CATEGORY for each individual, pair, or set of MEASURING CIRCUIT TERMINALS, or symbol 14 of Table 1 shall be marked as specified in 5.1.5.101.2 and 5.1.5.101.3, if applicable.

MEASURING CIRCUIT TERMINALS are usually arranged in pairs or sets. Each pair or set of TERMINALS may have a RATED voltage or a RATED current, or both, within that set, and each individual TERMINAL may have a RATED voltage to earth. For some equipment, the RATED voltage between TERMINALS may be different from the RATED voltage to earth. Markings shall be clear to avoid misunderstanding.

Symbol 14 of Table 1 shall be marked if current MEASURING CIRCUIT TERMINALS are not intended for connection to the secondary of current transformers without internal protection (see 9.101.6.2).

Markings shall be placed adjacent to the TERMINALS. However, if there is insufficient space (as in multi-input equipment), the marking may be on the RATING plate or scale plate, or the TERMINAL may be marked with symbol 14 of Table 1.

For any set of MEASURING CIRCUIT TERMINALS, symbol 14 of Table 1 does not need to be marked more than once, if it is close to the TERMINALS.

Conformity is checked by inspection and, if applicable, as specified in 5.1.5.101.2, 5.1.5.101.3 and 5.1.5.101.4, taking the exceptions in 5.1.5.101.5 into account.

5.1.5.101.2 MEASURING CIRCUIT TERMINALS RATED for MEASUREMENT CATEGORIES

The relevant MEASUREMENT CATEGORY shall be marked for TERMINALS of MEASURING CIRCUITS RATED for MEASUREMENT CATEGORIES. The MEASUREMENT CATEGORY markings shall be "CAT II", "CAT III" or "CAT IV" as applicable.

The RATED voltage of the TERMINALS of a MEASURING CIRCUIT intended for MAINS voltage measurements shall be equal to or higher than their RATED a.c. r.m.s. line-to-neutral or d.c. voltage.

Marking those TERMINALS with more than one type of MEASUREMENT CATEGORY and its RATED voltage is permissible.

Conformity is checked by inspection.

5.1.5.101.3 MEASURING CIRCUIT TERMINALS RATED for connection to voltages above the levels of 6.3.1

Symbol 14 of Table 1 shall be marked adjacent to the TERMINALS for MEASURING CIRCUIT TERMINALS RATED for connection to voltages above the levels of 6.3.1, but that are not RATED for MEASUREMENT CATEGORIES (see also 5.4.1 bb)).

Conformity is checked by inspection.

5.1.5.101.4 HAZARDOUS LIVE output TERMINALS

Output TERMINALS which can be HAZARDOUS LIVE shall be marked with symbol 12 of Table 1 in close proximity to those TERMINALS.

Conformity is checked by inspection.

5.1.5.101.5 MEASURING CIRCUIT TERMINALS which are permanently connected, dedicated or for non-HAZARDOUS LIVE voltages

MEASURING CIRCUIT TERMINALS do not need to be marked if:

- a) they are intended to be permanently connected and not ACCESSIBLE (see 5.4.3 aa) and bb)), or
- b) they are dedicated only for connection to specific TERMINALS of other equipment, or
- c) it is obvious from other indications that the RATED voltage does not exceed the levels of 6.3.1.

NOTE Examples of acceptable indications that the RATED voltage of the inputs is intended to not exceed the levels of 6.3.1 include:

- the full-scale deflection marking of a single-range indicating voltmeter or ammeter or maximum marking of a multi-range multimeter;
- the maximum range marking of a voltage selector switch;
- a marked voltage or power RATING expressed in dB, mW or W, where the equivalent value, as explained in the documentation, does not exceed 30 V a.c.

Conformity is checked by inspection.

5.4.1 GENERAL

Add the following two new items to the list of the first paragraph after item k):

- aa) information about each relevant MEASUREMENT CATEGORY if the MEASURING CIRCUIT is RATED for MEASUREMENT CATEGORIES (see 5.1.5.101.2);
- bb) for MEASURING CIRCUITS that are not RATED for MEASUREMENT CATEGORIES, but that could be misused by connection to such circuits, a warning not to use the equipment for measurements on MAINS, and a detailed RATING including TRANSIENT OVERVOLTAGES (see AA.2.4 for more information).

Add a new paragraph between the first and the second paragraph:

Some equipment may have multiple MEASUREMENT CATEGORY RATINGS for the same MEASURING CIRCUIT. For such equipment, the documentation shall clearly identify the MEASUREMENT CATEGORIES where the equipment is intended to be used and where it shall not be used.

5.4.2 Equipment RATINGS

Add the following three new items to the list of the first paragraph after item f):

- aa) the output voltage or voltage range, frequency and current RATING;
- bb) for insulation resistance measurement equipment, the RATED line or unit capacitance as required by 6.102;
- cc) for insulation resistance measurement equipment intended for use in power station or substation, the RATED induced current (see 9.101.5).

5.4.3 Equipment installation

Add the following two new items to the list of the first paragraph after item i):

- aa) for MEASURING CIRCUIT TERMINALS intended for permanent connection and that are RATED for MEASUREMENT CATEGORIES, information regarding the MEASUREMENT CATEGORY, RATED voltages or RATED currents as applicable (see 5.1.5.101.2);
- bb) for MEASURING CIRCUIT TERMINALS intended for permanent connection and that are not RATED for MEASUREMENT CATEGORIES, information regarding the RATED voltages, RATED currents, and RATED TRANSIENT OVERVOLTAGES as applicable (see 5.1.5.101.5).

5.4.4 Equipment operation

Add the following four new items to the list of the first paragraph after item k):

- aa) instructions for a daily or routine check to ensure the correct functionality of the equipment before use when one HAZARD indicator has been considered to be sufficient (see 6.103);
- bb) when performing an a.c. voltage test, instructions to warn the OPERATOR that a hazardous residual voltage can be present after the interruption of the test if the capacitance value of the line or unit under test exceeds the maximum RATED line or unit capacitance value (see 6.102.3);
- cc) when an automatic operation to energise the equipment outputs is provided, a warning to keep distance from the unit under test;
- dd) when performing an d.c. current measurement in series with an inductive circuit, instructions to warn the OPERATOR that a hazardous voltage can be present if the circuit is suddenly opened (a probe falls off for example) (see 101 d)).

449

450 **6.2.1 General**451 *Insert the following NOTE 101 after the third paragraph:*452 NOTE 101 For determination of ACCESSIBLE parts of equipment intended to be used in educational establishment by
453 pupil OPERATORS, see IEC 61010-2-130.

454

455 **6.3.2 Levels in SINGLE FAULT CONDITION**456 *Replace the existing item c) with the following new item c):*

457 c) The levels of:

458 1) 1,6 J for inductive or capacitive stored energy, except

459 2) the capacitance from line B of Figure 3 for voltages up to 40 kV peak or DC.

460

461 **6.5.1 General**462 *Replace the existing item c) with the following new item c):*

463 c) automatic disconnection of HAZARDOUS LIVE voltage source (see 6.5.5);

464

465 **6.5.2.3 PROTECTIVE CONDUCTOR TERMINAL**466 *Replace the existing item h) 2) with the following new item h) 2):*467 h) 2) the PROTECTIVE BONDING shall not be interrupted by any switching or interrupting device.
468 Devices used for indirect bonding in MEASURING CIRCUITS (see 6.5.5 and 6.5.6) are permitted
469 to be part of the PROTECTIVE BONDING.

470

471 *Replace in Figure 4, the text in the cell referenced 6.5.1 c) by the text "Automatic disconnection*
472 *of HAZARDOUS LIVE voltage source"*

473

474 **6.5.5 Automatic disconnection of the supply**475 *Replace the existing title of 6.5.5 with the following new title:*476 **6.5.5 Automatic disconnection of HAZARDOUS LIVE voltage source**

477

478 *Add the following five paragraphs after the last paragraph:*479 For MEASURING CIRCUITS, voltage-sensitive tripping devices can be used to establish indirect
480 bonding between the PROTECTIVE CONDUCTOR TERMINAL and ACCESSIBLE conductive parts if
481 these become HAZARDOUS LIVE as a result of a fault.

Voltage-sensitive tripping devices interrupt the HAZARDOUS LIVE voltage source, or connect the ACCESSIBLE conductive parts to the PROTECTIVE CONDUCTOR TERMINAL whenever the voltage across them reaches the relevant levels of 6.3.2 a). The tripping duration versus the current shall not exceed the levels of Figure 2.

Conformity is checked by applying successively the relevant voltage level of 6.3.2 a) and the maximum RATED voltage of the MEASURING CIRCUIT between the ACCESSIBLE conductive parts and the PROTECTIVE CONDUCTOR TERMINAL. The current between the ACCESSIBLE conductive parts and the PROTECTIVE CONDUCTOR TERMINAL is measured with the circuit of Figure A.1. During and after the test, no HAZARD shall arise, nor shall there be any evidence of fire, arcing, explosion, or damage to voltage-sensitive tripping devices, including traces on the printed wiring board.

Voltage-sensitive tripping devices used to establish indirect bonding shall have at least the voltage and current RATINGS of the MEASURING CIRCUIT TERMINALS.

Conformity is checked by inspection.

6.5.6 Current or voltage-limiting device

Add the following four new paragraphs after the last paragraph:

For MEASURING CIRCUITS, voltage-limiting devices can be used to establish indirect bonding between the PROTECTIVE CONDUCTOR TERMINAL and ACCESSIBLE conductive parts if these become HAZARDOUS LIVE as a result of a fault.

Voltage-limiting devices which become conductive when the voltage across them exceeds the relevant levels of 6.3.2 a) shall have overcurrent protection to prevent damage of the device.

Voltage-limiting devices are not suitable in the case of voltage applied from external sources to the accessible conductive parts.

Conformity is checked by introducing a single fault within the equipment or from external connection while the equipment is operated in NORMAL USE such that the maximum hazardous voltage presents itself to the ACCESSIBLE conductive parts protected by indirect bonding. The current between the ACCESSIBLE conductive parts and the PROTECTIVE CONDUCTOR TERMINAL is measured with the circuit of Figure A.1. The duration of current flow versus the body current shall not exceed the levels of Figure 2. During and after the test, no HAZARD shall arise, nor shall there be any evidence of fire, arcing, explosion, or damage to overcurrent protection devices, except for fuses which can open.

Add the following new subclause and new Table 101 after 6.6.4:

6.6.101 MEASURING CIRCUIT TERMINALS

6.6.101.1 General

HAZARDOUS LIVE TERMINALS shall be anchored, fitted or designed so that internal conductors and TERMINAL mechanical mountings will not work loose when the TERMINALS are tightened or loosened, or when connections are made.

When determining the values of CREEPAGE DISTANCES for MEASURING CIRCUIT TERMINALS of HAND-HELD EQUIPMENT intended to be connected only to a hand-held probe assembly complying

with IEC 61010-031, the applicable values of CREEPAGE DISTANCES from material group I are allowed to be applied to all material groups.

Requirements for MEASURING CIRCUIT TERMINALS in unmated position, partially mated or mated position are defined respectively in 6.6.101.2, 6.6.101.3 and 6.6.101.4. Requirements for specialized MEASURING CIRCUIT TERMINALS are defined in 6.6.101.5.

Annex CC provides information regarding the recommended dimensions of 4 mm "banana" TERMINALS.

6.6.101.2 MEASURING CIRCUIT TERMINALS in unmated position

The following requirements apply to MEASURING CIRCUIT TERMINALS in unmated position when RATED voltages are applied to any other TERMINALS of the equipment or when the MEASURING CIRCUIT TERMINALS are energized from inside the equipment.

- 1) ACCESSIBLE parts of locking-type or screw-held-type TERMINALS in unmated position including TERMINALS which do not require the use of a TOOL for unlocking or unscrewing shall not be HAZARDOUS LIVE.

Conformity is checked by inspection.

- 2) ACCESSIBLE parts of unmated TERMINALS which are separated from other circuits and can be energized only from inside of the equipment by continuous both-hand operation according to 6.101.2, c) in Note shall not be HAZARDOUS LIVE 5 s after the OPERATOR releases a switch.

Conformity is checked by inspection.

- 3) ACCESSIBLE parts of other unmated TERMINALS shall be insulated from HAZARDOUS LIVE parts by PROTECTIVE IMPEDANCE or CLEARANCES and CREEPAGE DISTANCES meeting the requirements of 3 a) and 3 b) of this subclause 6.6.101.2.

- a) For TERMINALS with a voltage RATING up to 20 000 V, the CLEARANCES shall be at least the applicable values of Table 101.

Table 101 – CLEARANCES for unmated MEASURING CIRCUIT TERMINALS

Maximum voltage applied to the conductive parts of the TERMINAL V	CLEARANCE	
	a.c. r.m.s. mm	d.c. mm
600	0,8	0,8
1 000	1,0	0,8
1 500	2,0	1,1
2 000	3,2	1,8
3 000	6,4	3,5
5 000	13	8,3
10 000	30	20
15 000	48	32
20 000	67	44
For maximum voltages above 30 V a.c. r.m.s. or 60 V d.c. up to 600 V, CLEARANCES are 0,8 mm. Linear interpolation is allowed above 600 V. NOTE See Annex EE for determination of the CLEARANCES.		

For TERMINALS with a voltage RATING above 20 000 V, the CLEARANCE shall be at least the D_2 value of Table K.15 with U_m equal to 1,25 times the peak value of the voltage (see K.3.2).

If the equipment is RATED to operate at an altitude greater than 2 000 m, the value of the CLEARANCE shall be multiplied by the applicable factor of Table 3.

Conformity is checked by inspection and measurement of CLEARANCE from the closest approach of the test finger touching the external parts of the TERMINAL in the least favourable position (see Figure 1).

If the CLEARANCES are less than the minimum required, they shall be verified by the a.c. voltage test.

Conformity is checked by the a.c. voltage test of with a duration of at least 3 cycles using the applicable test voltage for impulse of Table K.16 for the required CLEARANCE.

Correction factors of Table 10 are applicable to the values of test voltages for CLEARANCES given in Table K.16.

- b) The CREEPAGE DISTANCE values shall be at least the applicable CLEARANCE values defined in 3 a) of this subclause 6.6.101.2.

Conformity is checked by inspection and measurement of CREEPAGE DISTANCES from the closest approach of the test finger touching the external parts of the TERMINAL in the least favourable position.

In addition for equipment RATED for WET LOCATIONS, conductive parts of TERMINALS with voltage RATINGS above 16 V a.c. r.m.s., 22,6 V a.c. peak or 35 V d.c. shall not be ACCESSIBLE.

Conformity is checked by inspection and measurement.

6.6.101.3 MEASURING CIRCUIT TERMINALS in partially mated position

ACCESSIBLE parts of MEASURING CIRCUIT TERMINALS in partially mated position which are separated from other circuits and can only be energized from inside the equipment by a continuous both-hand operation according to 6.101.2, d) in Note shall not be HAZARDOUS LIVE 5 s after the OPERATOR released a switch.

ACCESSIBLE parts of other MEASURING CIRCUIT TERMINALS in partially mated position shall be insulated from HAZARDOUS LIVE parts by BASIC INSULATION.

Conformity is checked by inspection and measurement.

6.6.101.4 MEASURING CIRCUIT TERMINALS in mated position

ACCESSIBLE parts of MEASURING CIRCUIT TERMINALS in mated position which are not intended to be HAND-HELD or touched during the measurement operation shall be insulated from HAZARDOUS LIVE parts by BASIC INSULATION.

ACCESSIBLE parts of TERMINALS in mated position of other MEASURING CIRCUITS shall be insulated from HAZARDOUS LIVE parts by DOUBLE INSULATION or REINFORCED INSULATION.

Conformity is checked by inspection and measurement.

6.6.101.5 Specialized MEASURING CIRCUIT TERMINALS

Specialized MEASURING CIRCUIT TERMINALS are TERMINALS intended to be connected to components, sensors, and devices.

NOTE These specialized TERMINALS include, but are not limited to, TERMINALS for thermocouple sockets.

Components, sensors, and devices intended to be connected to specialized MEASURING CIRCUIT TERMINALS shall not be both ACCESSIBLE and HAZARDOUS LIVE, in either NORMAL CONDITION or in SINGLE FAULT CONDITION, even when the highest RATED voltage is applied to any other MEASURING CIRCUIT TERMINAL.

Conformity is checked by inspection and measurement. Components, sensors, and devices intended to be connected to specialized MEASURING CIRCUIT TERMINALS are connected. The measurements of 6.3 are made to establish that the levels of 6.3.1 and 6.3.2 are not exceeded when each of the following voltages is applied to each of the other MEASURING CIRCUIT TERMINAL, if applicable:

- a) highest RATED a.c. voltage at any RATED MAINS frequency;*
- b) highest RATED d.c. voltage;*
- c) highest RATED a.c. voltage at the related maximum RATED measurement frequency.*

6.7.1.3 CREEPAGE DISTANCES

Insert the following new paragraph between the third paragraph and the fourth paragraph:

For HAND-HELD EQUIPMENT not powered from the MAINS or from the MEASURING CIRCUIT, the applicable values of CREEPAGE DISTANCES from material group I are allowed to be applied to all materials.

6.7.1.5 Requirements for insulation according to type of circuit

Replace the text of the subclause with the following new text:

Requirements for insulation in particular types of circuits are specified as follows:

- a) in 6.7.2 for MAINS CIRCUITS of OVERVOLTAGE CATEGORY II with a nominal supply voltage up to 300 V;
- b) in 6.7.3 for secondary circuits separated from the circuits in a) by means of a transformer only;
- c) in Clause K.1 for MAINS CIRCUITS of OVERVOLTAGE CATEGORY III or IV or for OVERVOLTAGE CATEGORY II over 300 V;
- d) in Clause K.2 for secondary circuits separated from the circuits in c) by means of a transformer only;
- e) in Clause K.3 for circuits that have one or more of the following characteristics:
 - 1) the maximum possible TRANSIENT OVERVOLTAGE is limited by the supply source or within the equipment to a known level below the level assumed for the MAINS CIRCUIT;
 - 2) the maximum possible TRANSIENT OVERVOLTAGE is above the level assumed for the MAINS CIRCUIT;
 - 3) the WORKING VOLTAGE is the sum of voltages from more than one circuit, or is a mixed voltage;
 - 4) the WORKING VOLTAGE includes a recurring peak voltage that may include a periodic non-sinusoidal waveform or a non-periodic waveform that occurs with some regularity;
 - 5) the WORKING VOLTAGE has a frequency above 30 kHz;
 - 6) the circuit is a MEASURING CIRCUIT where MEASUREMENT CATEGORIES do not apply;
- f) in Clause K.101 for MEASURING CIRCUITS RATED for MEASUREMENT CATEGORIES.

NOTE 1 See Annex I for line-to-neutral voltage pertinent to MAINS system type and nominal voltages.

NOTE 2 These requirements are illustrated in the flowchart of Annex DD, Figure DD.1.

NOTE 3 See Clause K.3 for requirements for switching circuits such as a switching power supply.