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Interested committees:

Title: Draft BS EN 61010-2-034 Ed.2.0 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.

Please notify the secretary if you are aware of any keywords that might assist in classifying or identifying the standard or if the content of this standard

- 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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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 Please indicate if you are aware of any reason why this draft standard should not be published as a British Standard.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

- **Annotated drafts are not acceptable and will be rejected.**
- All comments should be submitted online at <https://standardsdevelopment.bsigroup.com/>. You will need to register in order to comment.

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	Commend (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.	



66/733/CD

COMMITTEE DRAFT (CD)

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SUPERSEDES DOCUMENTS:
66/731/RR

IEC TC 66 : SAFETY OF MEASURING, CONTROL AND LABORATORY EQUIPMENT	
SECRETARIAT: United Kingdom	SECRETARY: Mr David Hyde
OF INTEREST TO THE FOLLOWING COMMITTEES: TC 78, TC 85	PROPOSED HORIZONTAL STANDARD: ☒ Other TC/SCs are requested to indicate their interest, if any, in this CD to the secretary.
FUNCTIONS CONCERNED: ☐ EMC ☐ ENVIRONMENT ☐ QUALITY ASSURANCE ☒ 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.

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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CONTENTS

1	CONTENTS	2
2	FOREWORD	4
3	CHANGES	6
4	INTRODUCTION	7
5	1 Scope and object	8
6	2 Normative references	8
7	3 Terms and definitions	9
8	4 Tests	10
9	5 Marking, documentation and HAZARD indicator	10
10	6 Protection against electric shock	14
11	7 Protection against mechanical hazards	20
12	8 Resistance to mechanical stresses	21
13	9 Protection against the spread of fire and arc flash	21
14	10 Equipment temperature limits and resistance to heat	26
15	11 Protection against HAZARDS from fluids and solid foreign objects	27
16	12 Protection against radiation, including laser sources, and against sonic and ultrasonic pressure	27
17	13 Protection against liberated gases and substances, explosion and implosion	27
18	14 Components and subassemblies	27
19	15 Protection by interlocks	27
20	16 HAZARDS resulting from application	27
21	17 Risk assessment	27
22	101 Measuring circuits	27
23	Annexes	31
24	Annex A	31
25	Annex K (normative) Insulation requirements not covered by 6.7	31
26	Annex L (informative) Index of defined terms	44
27	Annex AA (normative) MEASUREMENT CATEGORIES	45
28	Annex BB (informative) HAZARDS pertaining to measurements performed in certain environments	47
29	Annex CC (informative) 4-mm "banana" TERMINALS	50
30	Annex DD (informative) Flowchart for insulation according to the type of circuit	52
31	Annex EE (informative) Determination of CLEARANCES for Table 101	55
32	Bibliography	56
33	Figure 101 – Duration of current flow versus body current for a.c. and d.c. currents	15
34	Figure 102 – Test circuit for induced voltage and current	26
35	Figure K.101 – Test circuit for evaluation of TRANSIENT OVERVOLTAGE in unearthed secondary circuits	35
36	Figure K.102 – Circuit with protective screen	36
37	Figure K.103 – Circuit with DOUBLE INSULATION	37
38	Figure AA.1 – Example to identify the locations of measuring circuits	40

44	Figure CC.1 – Recommended dimensions of 4-mm TERMINALS	51
45	Figure DD.1 – Requirements for CLEARANCE, CREEPAGE DISTANCE and solid insulation.....	54
46		
47	Table 101 – Clearances for unmated measuring circuit terminals	16
48	Table 102 – Impulse voltages.....	24
49	Table K.15 – CLEARANCE values for the calculation of K.3.2	32
50	Table K.16 – Test voltages based on CLEARANCES	33
51	Table K.101 – Maximum TRANSIENT OVERVOLTAGES	38
52	Table K.102 - CLEARANCES of measuring circuits RATED for MEASUREMENT CATEGORIES.....	39
53	Table K.103 – a.c. voltages for testing electric strength of solid insulation in	
54	measuring circuits of MEASUREMENT CATEGORY	40
55	Table K.104 – Impulse test voltages for testing electric strength of solid insulation in	
56	measuring circuits RATED for MEASUREMENT CATEGORIES	40
57	Table K.105 – Minimum values for distance or thickness of solid insulation in	
58	measuring circuits rated for measurement categories	41
59	Table AA.1 – Characteristics of MEASUREMENT CATEGORIES	46
60	Table EE.1 – Clearances values for Table 101	55
61		

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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International Standard IEC 61010-2-034 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 second edition cancels and replaces the first edition published in 2017. This edition constitutes a technical revision.

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

FDIS	Report on voting
66/xxx/FDIS	66/xxx/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.

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 Part 2-034 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) of IEC 61010-1, including its amendment 1 (2016).

This Part 2-034 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 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:

a) 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;

b) 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,
- 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.

CHANGES

This edition includes numerous editorial changes and the following significant technical changes with respect to the previous edition.

Major modifications to edition 1 are in red text.

- a) 1.2.1: Requirements for protection against HAZARDS which could occur from reading a voltage have been added to the scope
- b) Clause 2: Normative documents have been dated when relevant
- c) 4.3.2.5: Requirements for power supply have been modified
- d) 4.3.2.6: Requirements for inputs/outputs have been modified
- e) 5.1.5.101.2: Minimum RATINGS for TERMINALS voltage are given
- f) 5.4.2: New RATINGS for documentation
- g) 5.101.1: HAZARD indicators shall be functional in NORMAL CONDITION and in SINGLE FAULT CONDITION
- h) 6.6.101.1: Insulating material of group I are allow for determination of CLEARANCES of some measuring circuit TERMINALS
- i) 6.6.101.2: CLEARANCES and CREEPAGE DISTANCES above 1 500 V for measuring circuit TERMINALS in unmated position have been defined (see new Table 101)
- j) 6.6.101.3: Requirements for measuring circuit TERMINALS in partially-mated position have been specified
- k) 6.6.101.4: Requirements for measuring circuit TERMINALS in mated position have been specified
- l) 6.7.3.1: Another method for determination of CLEARANCES of secondary circuits is proposed
- m) 6.102 replaces 6.9.103 and has been rephrased.
- n) A new 9.101 has been added to consider the protection of measuring circuits against arc flash or fire
- o) 9.101.2 is a relocation of 101.3
- p) 9.101.3 is a relocation of 101.4, has been extended to MEASUREMENT CATEGORY II and refers to IEC 61000-4-5 for tests
- q) 9.101.4 is a relocation of 16.1.102
- r) 9.101.5 is a relocation of K.103 for induced current, with numerous changes
- s) 14.101: Circuits used to limit TRANSIENT OVERVOLTAGE has been removed
- t) A new 101.3 expands previous 101.5 and adds more protection against HAZARD occurring from reading a voltage value
- u) A method to determine U_t for unearthed secondary circuits has been added in K.2.101
- v) K.3.101 is a relocation of 6.9.104
- w) K.3.102 is also a relocation of K.103 for induced voltage, with clarifications
- x) Table K.101 has been updated as Table K.102
- y) Table K.103 and Table K.104 replace Table K.102, Table K.103 and Table K.104
- z) K.101.4 has been reviewed. Tables and tests for solid insulation have been modified. Table K.105 replaces Table K.9.
- aa) Table K.106 has been expanded up to 3 000 V.

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 amendment will be supplemented or modified by the special requirements of one, or more than one, particular Part 2 of the standard which are read in conjunction with the Part 1 requirements.

This Part 2-034 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.

Part 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.

Part 2-032 specifies the safety requirements for HAND-HELD and hand-manipulated current sensors (see Clause 1 of Part 2-032).

Part 2-033 specifies the safety requirements for HAND-HELD MULTIMETERS and other METERS that have a primary purpose of measuring voltage on a live MAINS.

All requirements of Part 2-030 have been included into Part 2-034. Equipment within the scopes of both Part 2-030 and Part 2-034 are considered to be covered by the requirements of Part 2-034.

However, for equipment within the scope of Part 2-032, Part 2-033 and Part 034, the standards are read in conjunction.

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

1 Scope and object

This clause of Part 1 is applicable except as follows:

1.1.1 Equipment included in scope

Replace the existing text with the following:

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

This part of IEC 61010 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.

1.1.2 Equipment excluded from scope

Add the following new items to 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).

1.2.1 Aspects included in scope

Add the following new paragraph at the end of the subclause:

Requirements for protection against HAZARDS resulting from NORMAL USE and REASONABLY FORESEEABLE MISUSE of measuring circuits and which could occur from reading a voltage are given in Clause 101.

2 Normative references

This clause of Part 1 is applicable except as follows:

Replace

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

with the following new reference:

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

Replace

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*

with the following new reference:

IEC 61010-031:202X¹, *Safety requirements for electrical equipment for measurement, control and laboratory use – Part 031: Safety requirements for hand-held and hand-manipulated probe assemblies for electrical test and measurement*

Replace

IEC 61180 (all parts), *High-voltage test techniques for low-voltage equipment*

IEC 61180-1, *High-voltage test techniques for low-voltage equipment – Part 1: Definitions, test and procedure requirements*

IEC 61180-2, *High-voltage test techniques for low-voltage equipment – Part 2: Test equipment*

with the following new reference:

IEC 61180:2016, *High-voltage test techniques for low-voltage equipment – Definitions, test and procedure requirements, test equipment*

Add the following new normative references:

IEC 61000-4-5:2014+AMD1:2017, *Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test*

IEC 61010-2-032:2019, *Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 2-032: Particular requirements for hand-held and hand-manipulated current sensors for electrical test and measurement*

3 Terms and definitions

This clause of Part 1 is applicable except as follows:

3.5 Safety terms

Replace the definition of 3.5.4 with the following new definition:

¹ IEC 61010-031 Edition 3 is at committee draft (CD) stage. Edition date will be updated before publication.

3.5.4**MAINS**

electricity supply system

Add the following new term and definition:

3.5.101**MEASUREMENT CATEGORY**

classification of testing and measuring circuits according to the type of MAINS to which they are intended to be connected

Note 1 to entry: MEASUREMENT CATEGORIES take into account OVERVOLTAGE CATEGORIES, short-circuit current levels, the location in the building installation where the test or measurement is to be made and some forms of energy limitation or transient protection included in the building installation. See Annex AA for more information.

4 Tests

This clause of Part 1 is applicable except as follows:

4.3.2.5 MAINS supply

Replace the existing title and text with:

4.3.2.5 Power supply

The following requirements apply.

- a) The MAINS supply voltage shall be between 90 % and 110 % of any RATED supply voltage for which the equipment can be set or, if the equipment is RATED for a greater fluctuation, at any supply voltage within the fluctuation range.
- b) The MAINS frequency shall be any RATED frequency.
- c) Equipment for both a.c. and d.c. shall be connected to an a.c. or d.c. supply.
- d) Equipment powered by single-phase a.c. MAINS supply shall be connected both with normal and reverse polarity.
- e) If the means of connection permit reversal, battery-operated and d.c. equipment shall be connected with both reverse and normal polarity.

4.3.2.6 Input and output voltages

Replace the existing title and text with:

4.3.2.6 Input and output voltages or currents

Input and output voltages or currents, including floating voltages but excluding the MAINS supply voltage, shall be set to any voltage or current within their RATED range, in normal and reverse polarity if possible.

5 Marking and documentation

Replace the existing title with:

5 Marking, documentation and HAZARD indicator

This clause of Part 1 is applicable except as follows:

5.1.5 TERMINALS, connections and operating devices

Add the following new subclause:

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 standard also serve as output TERMINALS.

Except as permitted in 5.1.5.101.5:

- a) the value of the RATED voltage to earth of measuring circuit TERMINALS shall be marked, and
- 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 5.1.5.101.1 and 5.1.5.101.2, 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 TERMINALS are not intended for connection to current transformers without internal protection (see 101.2).

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. line-to-neutral or d.c. voltage.

NOTE CLEARANCES are specified for a nominal a.c. r.m.s. line-to-neutral or d.c. voltage of MAINS being measured (see Table K.102 and Annex I). Neutral is considered to be earthed.

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 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 of measurement equipment for insulation resistance and test equipment for electric strength 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 is below the levels of 6.3.1.

NOTE Examples of acceptable indications that the inputs are intended to be less than 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, is below 30 V a.c.

Conformity is checked by inspection.

5.4.1 General

Add the following two new items to the list and a new paragraph at the end of the list:

- 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).

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:

- aa) the output voltage or voltage range, frequency and current RATING;
- bb) for insulation resistance measurement equipment, the RATED line or unit capacitances as required by 6.102;

cc) for insulation resistance measurement equipment intended for use in power station or substation, the **RATED** induced current and voltage.

5.4.3 Equipment installation

Add the following two new items to the list:

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).

Add the following new subclause:

5.101 HAZARD indicator

5.101.1 General

At least one of the following HAZARD indicators shall be provided **and functional in NORMAL CONDITION and in SINGLE FAULT CONDITION of the indicator.**

a) Indicator lamp

Where an indicator lamp is provided, it shall illuminate or flash when there are HAZARDOUS LIVE voltages present on the TERMINALS. It may start illuminating or flashing at any point the output is activated.

The indicator lamp shall be red in colour.

If the indicator lamp flashes, the frequency shall be 50 cycles per minute to 300 cycles per minute. The duty cycle shall be at least 40 %.

Conformity is checked by inspection and measurement.

b) Variable visible indicator

Where a variable visible indicator with contrasting colours is provided, it shall operate when there are HAZARDOUS LIVE voltages present on the TERMINALS. It may start operating at any point the output is activated.

The visible indicator shall have equally spaced areas of significantly contrasting colours and/or patterns.

Conformity is checked by inspection.

c) Audible indicator

Where an audible indicator is provided, it shall produce a sound with a minimum constant sound pressure level of 70 dBA and a frequency of the fundamental wave lower than 5 kHz to warn the OPERATOR or a bystander when there are HAZARDOUS LIVE voltages present on the TERMINALS. It may start producing a sound at any point the output is activated.

Conformity is checked by measuring the maximum A-weighted sound pressure level at the OPERATOR'S position and at bystander positions. The following conditions apply.

1) *During measurement, the equipment is fitted and operated as in NORMAL USE.*

2) *Sound level meters used in the measurement conform either to type 1 of IEC 61672-1 or, if an integrating sound level meter, to type 1 of IEC 61672-2.*

3) *The distance between any wall or any other object and the surface of the equipment is not less than 3 m.*

5.101.2 HAZARD indicator lamp for fixed equipment

Where the test equipment can be permanently installed, provision shall be made to connect an external HAZARD indicator lamp.

The power source for the external indicator lamp may be separate from the test equipment.

Conformity is checked by inspection.

6 Protection against electric shock

This clause of Part 1 is applicable except as follows:

6.5.2.1 General

Replace the conformity statement with the following:

Conformity is checked as specified in 6.5.2.2 to 6.5.2.6 and 6.5.2.101.

6.5.2.3 PROTECTIVE CONDUCTOR TERMINAL

Replace h) 2) with the following:

- h) 2) the PROTECTIVE BONDING shall not be interrupted by any switching or interrupting device. Devices used for indirect bonding in testing and measuring circuits (see 6.5.2.101) are permitted to be part of the PROTECTIVE BONDING.

Add the following new subclause and figure:

6.5.2.101 Indirect bonding for testing and measuring circuits

Indirect bonding establishes a connection between the PROTECTIVE CONDUCTOR TERMINAL and ACCESSIBLE conductive parts if these become HAZARDOUS LIVE as a result of a fault.

Devices to establish indirect bonding are the following:

- a) Voltage limiting devices which become conductive when the voltage across them exceeds the relevant levels of 6.3.2 a), with overcurrent protection to prevent breakdown of the device. The duration versus the current shall not exceed the levels of Figure 101.

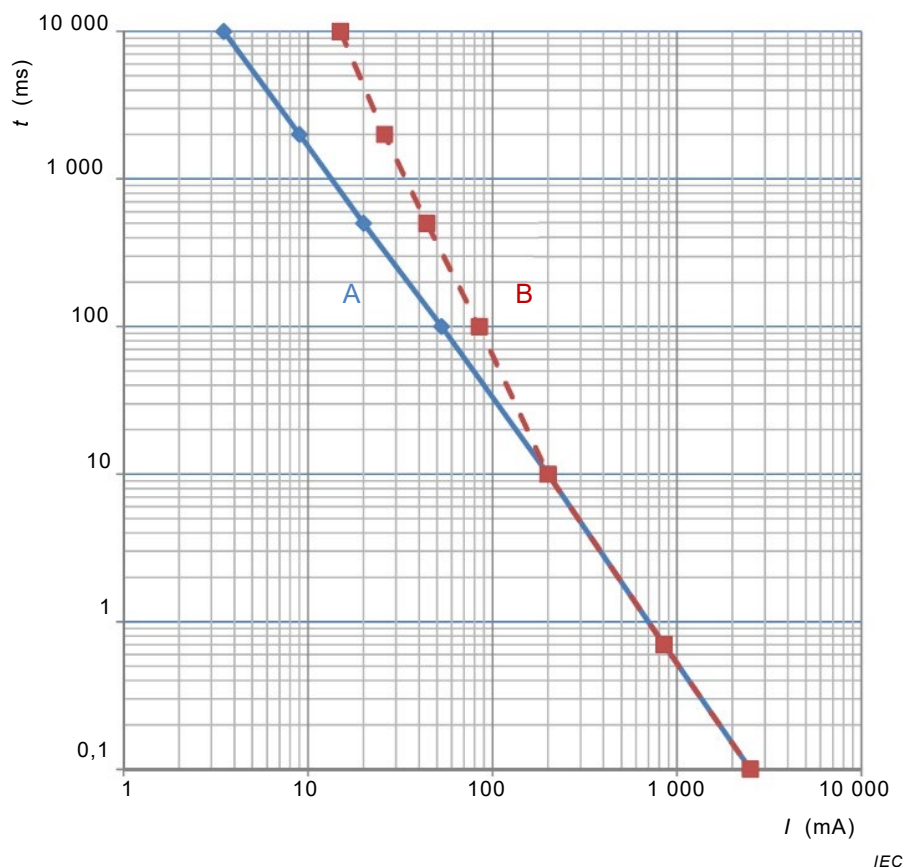
Conformity is checked by connecting the ACCESSIBLE conductive parts to the maximum HAZARDOUS LIVE voltage according to the equipment RATINGS while the equipment is operated in NORMAL USE. The current between the ACCESSIBLE conductive parts and the PROTECTIVE CONDUCTOR TERMINAL is measured with the circuit of Figure A.1.

- b) Voltage-sensitive tripping devices which interrupt all poles of the MAINS supply or the HAZARDOUS LIVE voltage source, and 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 101.

Conformity is checked by applying successively the relevant voltage level of 6.3.2 a) and the maximum RATED voltage 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.

Voltage limiting devices or voltage-sensitive tripping devices as defined in a) and b), shall have at least the voltage and current RATINGS of the measuring TERMINALS.

Conformity is checked by inspection.

**Key**

A Current a.c. (mA)

B Current d.c. (mA)

NOTE This figure is based on IEC TS 60479-1:2005, Figures 20 and 22, and IEC TS 60479-2:2007, Figure 20.

**Figure 101 – Duration of current flow versus body current
for a.c. and d.c. currents**

6.6 Connections to external circuits

Add the following new subclause and table:

6.6.101 Measuring circuit TERMINALS**6.6.101.1 General**

Material group I are allowed to be used for all insulating material 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.

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

When RATED voltages are applied to other measuring circuit TERMINALS on the equipment or energized from inside the equipment, the following requirements apply to TERMINALS in unmated position.

- 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 d), with a discharging time is below 5 sec according to 6.102 shall not be HAZARDOUS LIVE.

Conformity is checked by inspection.

- 3) ACCESSIBLE parts of other unmated measuring circuit TERMINAL shall be insulated from HAZARDOUS LIVE by PROTECTIVE IMPEDANCE or CLEARANCES and CREEPAGE DISTANCES meeting the requirements of a) and 1).

- a) For measuring circuit TERMINALS with an a.c. or d.c. voltage up to 20 000 V, the CLEARANCES shall be at least the applicable value 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.	d.c.
	mm	mm
30 to 300	0,8	0,8
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
Linear interpolation is allowed.		
NOTE See Annex EE.		

For measuring circuit TERMINALS with an a.c. or d.c. voltage 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 one of the following tests:

- i) 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), or