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Date: 12 March 2025

Origin: International

Latest date for receipt of comments: 02 April 2025

Project No. 2025/01047

Responsible committee: EPL/66 Safety of measuring, control and laboratory equipment

Interested committees:

Title: Draft BS EN 61010-2-033 Ed.4.0 BS EN 61010-2-033 Safety requirements for electrical equipment for measurement, control, and laboratory use. Part 2-033: Particular requirements for hand-held multimeters and other meters for domestic and professional use, capable of measuring mains voltage.

Please notify admin.start@bsigroup.com if you are aware of any keywords that might assist in clarifying or identifying the standard or of the content of this standard:

- i) has any issues related to 3rd party IPR, patent or copyright
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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 Please indicate if you are aware of any reason why this draft standard should not be published as a British Standard.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	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.	



66/843/CD

COMMITTEE DRAFT (CD)

PROJECT NUMBER:
IEC 61010-2-033 ED4

DATE OF CIRCULATION:
2025-03-07

CLOSING DATE FOR COMMENTS:
2025-05-02

SUPERSEDES DOCUMENTS:
66/839/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 78, TC 85	HORIZONTAL FUNCTION(S):
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 2-033: Particular requirements for hand-held multimeters and other meters for domestic and professional use, capable of measuring mains voltage

NOTE FROM TC/SC OFFICERS:

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**SAFETY REQUIREMENTS FOR ELECTRICAL EQUIPMENT
FOR MEASUREMENT, CONTROL, AND LABORATORY USE –****Part 2-033: Particular requirements for hand-held multimeters
and other meters for domestic and professional use,
capable of measuring mains voltage**

FOREWORD

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

IEC 61010-2-033 has been prepared by IEC technical committee 66: Safety of measuring, control and laboratory equipment. It is an International Standard.

This fourth edition cancels and replaces the third 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) 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;
- 5) conformity statements of K.3.2 and K.101.2 have been modified;
- 6) 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) in 6.6.101.1, a new requirement for TERMINALS is added;
- f) in 6.6.101.2, the conformity statement has been modified;
- g) in 6.8.1, a precision is given when testing solid insulation;
- h) a new 6.101 gives requirement for HAZARD indicator in case of hazardous voltage or energy;
- i) 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; an exception has been added for MEASURING CIRCUIT not RATED for MEASUREMENT CATEGORIES III or IV
- j) a new 14.9 with requirements for capacitors has been added;
- k) Clause 101 has been rephrased;
- 1) 101.2 has been moved to 9.101.4 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 hand-held multimeters and other meters for domestic and professional use, capable of measuring mains voltage*.

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",

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

"replacement", or "deletion" the relevant requirement, test specification or note in IEC 61010-1 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;

a) 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.

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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, 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 is 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) This document 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 this document.

4) IEC 61010-2-034:2023 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 IEC 61010-2-034. However, for equipment within the scope of IEC 61010-2-032 and IEC 61010-2-034, 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, this document, and IEC 61010-2-034. 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 2-033: Particular requirements for hand-held multimeters and other meters for domestic and professional use, capable of measuring mains voltage

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 for hand-held multimeters and other meters for domestic and professional use, capable of measuring MAINS.

Hand-held multimeters are multi-range multifunction measuring instruments intended to measure voltage and other electrical quantities such as resistance or current. Their primary purpose is to measure voltage on a live MAINS. They are suitable to be supported by one hand during NORMAL USE.

1.1.2 Equipment excluded from scope

Add the following new item to the list and the following new paragraph:

- aa) IEC 61557 (all parts), *Electrical safety in low voltage distribution systems up to 1 000 V AC and 1 500 V DC – Equipment for testing, measuring or monitoring of protective measures*

HAND-HELD EQUIPMENT such as oscilloscopes, wattmeters, process control multimeters not RATED for measuring voltage on a live MAINS, clamp multimeters and communications test sets are not within the scope of this document.

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 hand-held multimeters (see Clause 9);
- h) HAZARDS related to the use and REASONABLY FORESEEABLE MISUSE of the equipment (see Clause 16 and Clause 101).

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

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

Insert the following six 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

IEC 61010-2-030:—⁴, *Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 2-030: Special requirements for testing and measuring circuits*

IEC 61010-2-032:—⁵, *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*

IEC 61010-031:2022, *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*

Replace the definition of 3.5.6 with the following new definition:

3.5.6

MAINS

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

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

³ Second amendment under preparation. Stage at the time of publication: IEC CDV 61010-1/A2:2025.

⁴ Sixth edition under preparation. Stage at the time of publication: IEC CD 61010-2-030:2025.

⁵ Sixth edition under preparation. Stage at the time of publication: IEC CD 61010-2-032:2025.

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

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

286

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

288 **3.5.101**

289 **MEASURING CIRCUIT**

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

292 **3.5.102**

293 **MEASUREMENT CATEGORY**

294 classification of MEASURING CIRCUITS according to the type of MAINS to which they are intended
295 to be connected

296

297 **4.3.2.6 Input and output voltages**

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

299 **4.3.2.6 Input and output voltages or currents**

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

303

304 **4.4.2.1 General**

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

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

307

308 *Add the following new subclause after 4.4.2.15:*

309 **4.4.2.101 Surge protective devices**

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

312

313 **5.1.2 Identification**

314 *Add the following new Note after the existing Note:*

315 NOTE 101 Some national regulations can require a marking to indicate the name and edition of the standard used
316 for compliance evaluation.

317

318 **5.1.5.1 General**319 *Replace the first paragraph with the following:*

320 If necessary for safety, an indication shall be given of the purpose of TERMINALS, connectors,
321 controls, and indicators. Where there is insufficient space, symbol 14 from Table 1 may be used.

322

323 **5.1.5.2 TERMINALS**324 *Replace the existing item d) with the following new item d):*

325 d) TERMINALS supplied from the interior of the hand-held multimeter and which could be
326 HAZARDOUS LIVE, with the voltage, current, charge or energy value or range, or with
327 symbol 12 of Table 1;

328

329 *Add the following new item to the list:*

330 aa) TERMINALS supplied from other TERMINALS which could be HAZARDOUS LIVE, with
331 symbol 12 or symbol 14 of Table 1.

332

333 *Add the following new subclause after 5.1.5.2:*334 **5.1.5.101 MEASURING CIRCUIT TERMINALS**

335 MEASURING CIRCUIT TERMINALS are usually arranged in pairs or sets. Each pair or set of
336 TERMINALS may have a RATED voltage or a RATED current, or both, within that set, and each
337 individual TERMINAL will have a RATED voltage to earth. For some hand-held multimeters, the
338 RATED voltage between TERMINALS may be different from the RATED voltage to earth. Markings
339 shall be clear to avoid misunderstanding.

340 Each pair or set of MEASURING CIRCUIT TERMINALS that are intended to be used together shall be
341 marked with the value of the RATED voltage or the RATED current as applicable to the pair or set
342 of TERMINALS.

343 TERMINALS of MEASURING CIRCUITS RATED for MAINS voltage measurements shall be marked with
344 "CAT III" or "CAT IV" and its RATED a.c. r.m.s. line-to-neutral or d.c. voltage as applicable.
345 Marking those TERMINALS with these two types of MEASUREMENT CATEGORY is permissible.
346 Marking of MEASUREMENT CATEGORY II is not allowed. Other MEASURING CIRCUIT TERMINALS shall
347 be marked with the value of the RATED voltage to earth.

348 NOTE CLEARANCES and solid insulation for MEASUREMENT CATEGORIES are specified for a nominal a.c. r.m.s. line-
349 to-neutral or d.c. voltage of MAINS being measured. Neutral is considered to be earthed (see Table K.101 Annex I).

350 MEASURING CIRCUIT TERMINALS that do not have a RATING for connection to voltages above the
351 levels of 6.3.1, may be marked with alternative markings.

352 MEASURING CIRCUIT TERMINALS which are dedicated only for connection to specific TERMINALS of
353 other equipment need not be marked provided that there is a means of identifying these
354 TERMINALS.

355 TERMINAL markings shall be visible when the hand-held multimeter is ready for NORMAL USE with
356 connectors and TERMINALS mated and shall reference the applicable TERMINALS.

Conformity is checked by inspection.

5.2 Warning markings

Replace the existing text with the following text:

Warning markings specified in this document shall meet the following requirements.

Warning markings shall be visible when the hand-held multimeter is ready for NORMAL USE. If a warning applies to a particular part of the hand-held multimeter, the marking shall be placed on or near that part.

The size of warning markings shall be as follows.

a) Symbols shall be at least 2,75 mm high. Text shall be at least 1,5 mm high and contrast in colour with the background.

b) Symbols or text moulded, stamped or engraved in a material shall be at least 2,0 mm high. If not contrasting in colour, they shall have a depth or raised height of at least 0,5 mm.

If it is necessary for the RESPONSIBLE BODY or OPERATOR to refer to the instruction manual to preserve the protection afforded by the hand-held multimeter, the hand-held multimeter shall be marked with symbol 14 of Table 1. Symbol 14 is not required to be used together with symbols which are explained in the manual.

If the instructions for use state that an OPERATOR is permitted to gain access, using a TOOL, to a part which in NORMAL USE may be HAZARDOUS LIVE, there shall be a warning marking which states that the hand-held multimeter shall be isolated or disconnected from the HAZARDOUS LIVE voltage before access.

NOTE National regulations can require safety markings in a nationally accepted language.

Conformity is checked by inspection.

5.4.1 General

Replace the existing first paragraph except its list with the following new paragraph:

The following information necessary for safety purposes, as needed by the OPERATOR or the RESPONSIBLE BODY, shall be contained in the documentation provided with the hand-held multimeter, in an accepted language of the country where the product is intended to be placed on the market. Safety documentation for SERVICE PERSONNEL authorized by the manufacturer shall be made available to such personnel, in a language selected by the manufacturer:

Add the following two new items to the list:

aa) the documentation shall indicate that probe assemblies to be used for MAINS measurements shall be RATED as appropriate for MEASUREMENT CATEGORY III or IV according to IEC 61010-031:2022 and shall have a voltage RATING of at least the voltage of the circuit to be measured;

bb) information about each relevant MEASUREMENT CATEGORY (see 5.1.5.101).

Insert the following new paragraph between the first and the second paragraph after the list:

If the hand-held multimeter is capable of measuring in multiple MEASUREMENT CATEGORY RATINGS for the same MEASURING CIRCUIT, the documentation shall clearly identify the MEASUREMENT CATEGORIES where the hand-held multimeter may be used and where it shall not be used.

6.5.1 General

Replace the text, the conformity statement, and Figure 4 with the following text, conformity statement and Figure 4:

ACCESSIBLE parts shall be prevented from becoming HAZARDOUS LIVE in SINGLE FAULT CONDITION. The primary means of protection (see 6.4) shall be supplemented by one of a) or b) below. Alternatively, one of the single means of protection c) or d) below shall be used (see Figure 4 and Annex D).

- a) SUPPLEMENTARY INSULATION (see 6.5.3);
- b) current- or voltage-limiting device (see 6.5.6);
- c) REINFORCED INSULATION (see 6.5.3);
- d) PROTECTIVE IMPEDANCE (see 6.5.4).

Conformity is checked by inspection and as specified in 6.5.3, 6.5.4, or 6.5.6, as applicable.

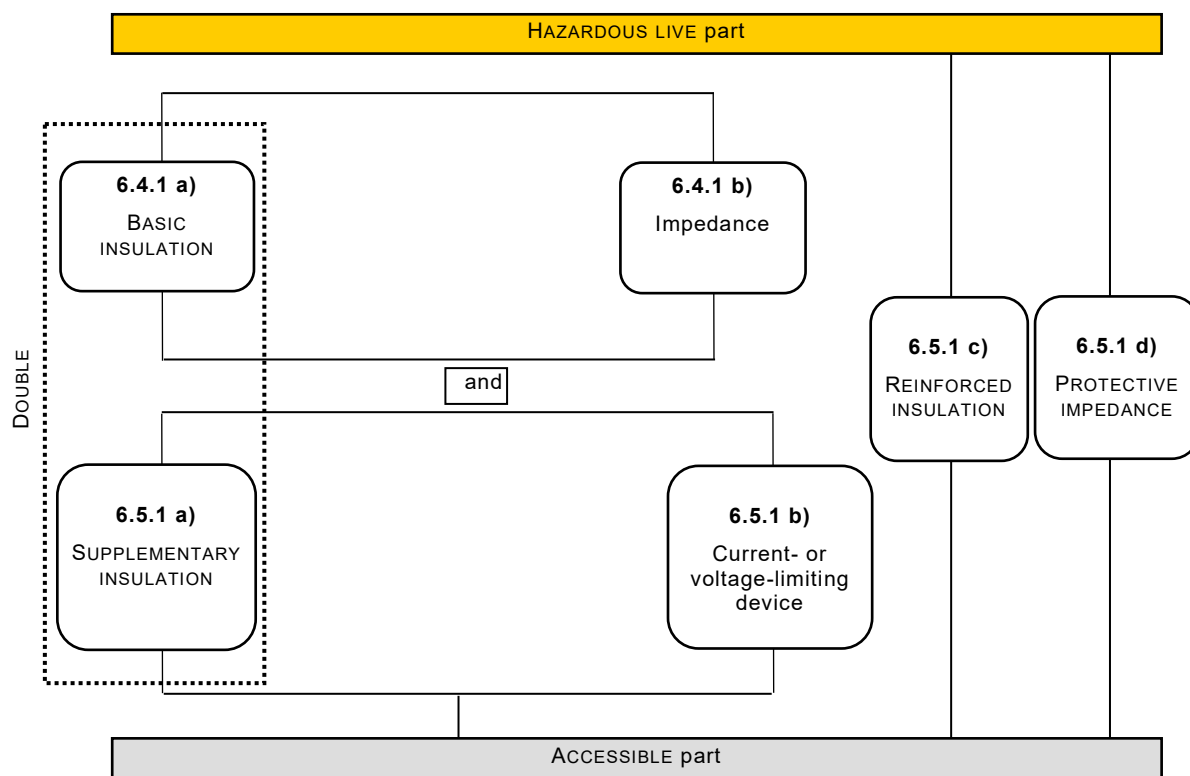


Figure 4 – Acceptable arrangement of protective means against electric shock

IEC 1010/10

416

417 **6.5.2 Protective bonding**418 *Replace the existing title of 6.5.2 with the following title and delete the text:*419 **6.5.2 Not used**

420

421 **6.5.5 Automatic disconnection of the supply**422 *Replace the existing title of 6.5.5 with the following title and delete the text:*423 **6.5.5 Not used**

424

425 *Add the following new subclause and new Table 101 after 6.6.4:*426 **6.6.101 MEASURING CIRCUIT TERMINALS**427 **6.6.101.1 General**

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

431 When determining the values of CREEPAGE DISTANCES for MEASURING CIRCUIT TERMINALS of a
432 hand-held multimeter intended to be connected only to a hand-held probe assembly complying
433 with IEC 61010-031, or to a current sensor complying with IEC 61010-2-032, the applicable
434 values of CREEPAGE DISTANCES from material group I are allowed to be applied to all material
435 groups.

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

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

441 **6.6.101.2 MEASURING CIRCUIT TERMINALS in unmated position**

442 The following requirements apply to MEASURING CIRCUITS TERMINALS in unmated position when
443 RATED voltages are applied to any other TERMINALS of the hand-held multimeter.

444 ACCESSIBLE parts of unmated MEASURING CIRCUIT TERMINALS shall be insulated from HAZARDOUS
445 LIVE parts by PROTECTIVE IMPEDANCE or CLEARANCES and CREEPAGE DISTANCES meeting the
446 requirements of a) and b) of this subclause 6.6.101.2 as follows.

447 a) For MEASURING CIRCUIT TERMINALS with a voltage RATING up to 3 000 V, the CLEARANCES shall
448 be at least the applicable values of Table 101.