

INTERNATIONAL STANDARD

NORME INTERNATIONALE



GROUP SAFETY PUBLICATION
PUBLICATION GROUPEE DE SÉCURITÉ

**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**

Exigences de sécurité pour appareils électriques de mesurage, de régulation et de laboratoire –

Partie 2-034: Exigences particulières applicables aux appareils de mesure de la résistance d'isolement et aux appareils d'essai de rigidité diélectrique



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GROUP SAFETY PUBLICATION
PUBLICATION GROUPEE DE SÉCURITÉ

**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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Exigences de sécurité pour appareils électriques de mesurage, de régulation et de laboratoire –

Partie 2-034: Exigences particulières applicables aux appareils de mesure de la résistance d'isolement et aux appareils d'essai de rigidité diélectrique

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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

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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.

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

FDIS	Report on voting
66/614/FDIS	66/622/RVD

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

This 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 test: 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).

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

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

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication 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 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.

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

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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

Replacement:

Replace the 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 for measurement equipment for insulation resistance and test equipment for electric strength with 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

Addition:

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).

2 Normative references

This clause of Part 1 is applicable except as follows:

Replacement:

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

Addition:

Add the following new normative reference:

IEC 61010-2-032, *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

Replacement:

Replace the definition of 3.5.4 with the following new definition:

3.5.4 MAINS

low-voltage electricity supply system

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Addition:

[IEC 61010-2-034:2017](https://standards.iteh.ai/catalog/standards/sist/99011ad7-4fcc-4631-8d8e-f6cd77a31cac/iec-61010-2-034-2017)

Add the following new definition: <https://standards.iteh.ai/catalog/standards/sist/99011ad7-4fcc-4631-8d8e-f6cd77a31cac/iec-61010-2-034-2017>

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.

5 Marking and documentation

This clause of Part 1 is applicable except as follows:

Replace the title with the following new title:

5 Marking, indicators and documentation

5.1.5 TERMINALS, connections and operating devices

Addition:

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 5.1.5.101.2 and 5.1.5.101.3, if applicable.

Measuring circuit TERMINALS are usually supplied 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 II, III or IV

The relevant MEASUREMENT CATEGORY shall be marked for measuring circuit TERMINALS RATED for measurements within MEASUREMENT CATEGORIES II, III or IV. The MEASUREMENT CATEGORY markings shall be “CAT II”, “CAT III” or “CAT IV” as applicable.

Marking more than one type of MEASUREMENT CATEGORY and its RATED voltage to earth 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 measurements within MEASUREMENT CATEGORIES II, III or IV (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 Permanently connected, dedicated or low voltage measuring circuit TERMINALS

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 below 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.

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5.4.1 General

Addition:

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Add the following new items to the list and a new paragraph:

- aa) information about each relevant MEASUREMENT CATEGORY if the measuring circuit has a RATING for MEASUREMENT CATEGORY II, III or IV (see 5.1.5.101.2);
- bb) for measuring circuits that do not have a RATING for MEASUREMENT CATEGORY II, III or IV, but 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 must not be used.

5.4.3 Equipment installation

Addition:

Add the following new items to the list:

- aa) for measuring circuit TERMINALS intended for permanent connection and that are RATED for MEASUREMENT CATEGORIES II, III or IV, information regarding the MEASUREMENT CATEGORY, RATED voltages or RATED current, 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 II, III or IV, information regarding the RATED voltages, RATED currents, and RATED TRANSIENT OVERVOLTAGES as applicable (see 5.1.5.101.5).

Addition:

Add the following new subclause:

5.101 HAZARD indicator

5.101.1 General

At least one of the following HAZARD indicators shall be provided:

a) HAZARD indicator lamp

Where a HAZARD 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

Replacement:

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

Replacement:

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.

Addition:

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.

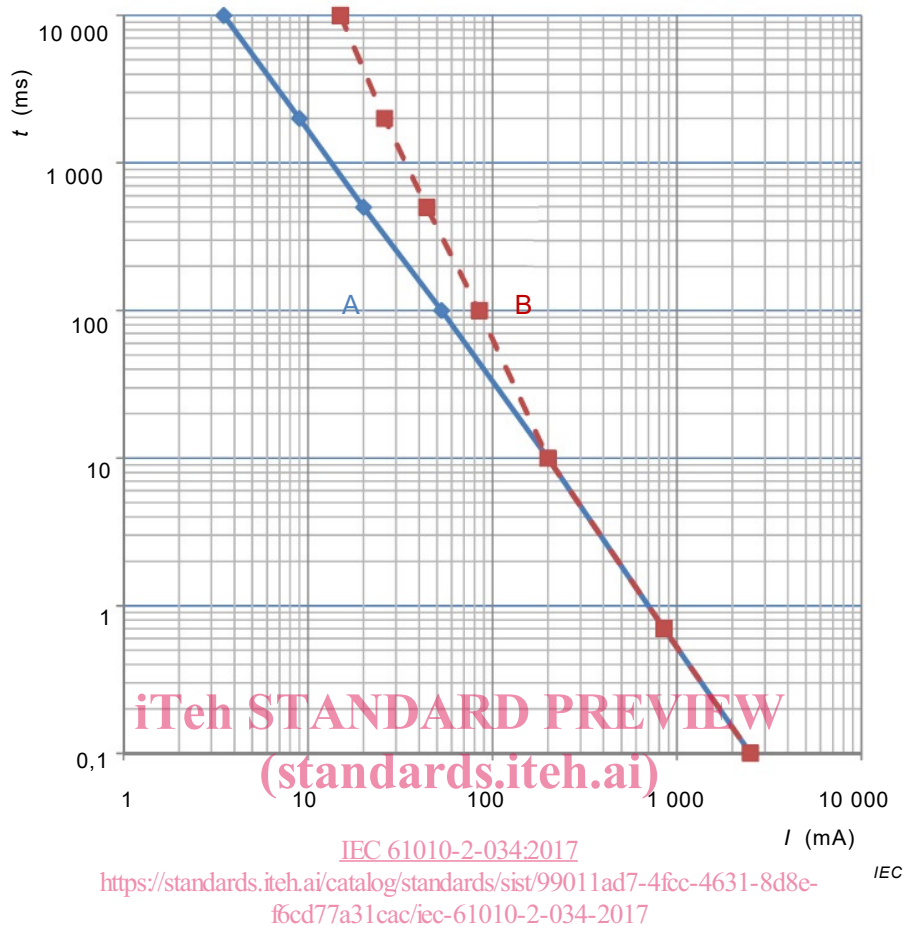
Conformity is checked by connecting the ACCESSIBLE conductive parts to the maximum HAZARDOUS LIVE voltage according to the equipment RATINGS while the equipment is operated in NORMAL USE. The current between the ACCESSIBLE conductive parts and the PROTECTIVE CONDUCTOR TERMINAL is measured with the circuit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

Addition:

Add the following new subclauses:

6.6.101 Measuring circuit TERMINALS

The conductive parts of each unmated measuring circuit TERMINAL which could become HAZARDOUS LIVE when the highest RATED voltage is applied to other measuring circuit TERMINALS on the equipment shall be separated by at least:

- for TERMINALS with voltage RATING up to 1 000 V a.c. or 1 500 V d.c., the applicable CLEARANCE and CREEPAGE DISTANCE of Table 101 from the closest approach of the test finger touching the external parts of the TERMINAL in the least favourable position (see Figure 1),
- for TERMINALS with voltage RATING exceeding 1 000 V a.c. or 1 500 V d.c., 2,8 mm for the CLEARANCE and CREEPAGE DISTANCE from the closest approach of the test finger touching the external parts of the TERMINAL in the least favourable position.