
Varnostne zahteve za električno opremo za meritve, nadzorovanje in laboratorijsko uporabo – 2-030. del: Posebne zahteve za preskušanje in merjenje tokokrogov

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

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Title:

IEC 61010-2-030 Ed. 1.0 Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 30 Special requirements for testing and measuring circuits

(Titre) :

CEI 61010-2-030 Ed. 1.0 Règles de sécurité pour appareils électriques de mesure, de régulation et de laboratoire - Partie 2 - 030 : Prescriptions particulières pour les circuits de test et de mesure

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Introduction

This document represents the proposed draft of the First Edition of IEC 61010-2-030, including the unique requirements for test and measurement circuits that have been removed from the Part 1 document.

It is necessary to circulate the draft of IEC 61010-1 with the matching companion draft of IEC 61010-2-030. All votes will need to take both drafts into account. All comments will need to be considered by both WG1 and WG2 to determine which document (or both documents) may be affected by the comment.

Introduction

Ce document constitue le projet de première édition de la CEI 61010-2-030, comprenant les exigences uniques pour les circuits de test et de mesure qui ont été retirées de la seconde édition de la CEI 61010-1.

Le projet de troisième édition de la CEI 61010-1 doit être diffusé obligatoirement avec le projet associé correspondant de la CEI 61010-2-030. Tous les votes devront tenir compte des deux projets. Tous les commentaires devront être examinés à la fois par les WG1 et WG2 pour déterminer quel document (ou les deux documents) peut être affecté par le commentaire.

ATTENTION CDV soumis en parallèle au vote (CEI) et à l'enquête (CENELEC)	ATTENTION Parallel IEC CDV/CENELEC Enquiry
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IEC 61010-2-030 Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 30 Special requirements for testing and measuring circuits

1 Scope and object

This clause of Part 1 is applicable except as follows.

1.1.1 Equipment included in scope

Replace the text with the following:

This part of IEC 61010 specifies safety requirements for testing and measuring circuits which are connected for test or measurement purposes to devices or circuits outside the measurement equipment itself.

These include also measurement circuits which are part of test and measurement equipment, laboratory equipment, or process control equipment. The presence of these circuits in equipment may require additional protective means between the circuit and an OPERATOR.

NOTE 1 –These testing and measurement circuits may, for example:

- measure voltages in circuits of other equipment,
- measure temperature of a separate device measured via a thermocouple,
- measure pressure of a separate device measured with a strain gauge,
- inject a voltage onto a circuit to analyze a new design.

This part of IEC 61010 applies to testing and measuring circuits which have a RATING for connection to voltages exceeding 33 V r.m.s., 46.7 V peak, or 70 V d.c., or which have a RATING for connection to circuits which are not limited energy circuits (see 9.3 of Part 1).

NOTE 2– Testing and measuring circuits that are not within the scope of this Part 2 are considered to be covered by the requirements of Part 1.

NOTE 3 – Equipment containing these testing and measuring circuits may be intended for performing tests and measurements on hazardous conductors, including MAINS conductors and telecommunication network conductors. See Annex AA for considerations of hazards involved in various tests and measurements.

2 Normative references

This clause of Part 1 is applicable.

3 Terms and definitions

This clause of Part 1 is applicable except as follows:

3.5 Safety terms

Add new subclauses:

3.5.101

MEASUREMENT CATEGORY

Classification of testing and measuring circuits according to the type of MAINS CIRCUITS and other circuits to which they are intended to be connected. They take into account standardized limits for transient overvoltages and potential energy levels, the line voltage to earth, the typical building installation impedances, and the location in the building installation at which the test or measurement is to be made.

4 Tests

This clause of Part 1 is applicable.

5 Marking and documentation

This clause of Part 1 is applicable, except as follows:

5.1.5 TERMINALS, connections, and operating devices

5.1.5.2 TERMINALS

Add a new item f), as follows:

- f) If equipment is intended to make measurements on a MAINS supply and to be powered from the same source, any TERMINALS to be connected to the MAINS supply shall be marked with the MEASUREMENT CATEGORY.

Add a new subclause:

5.1.5.101 Measuring circuit TERMINALS

Measuring circuit TERMINALS shall be marked with the RATED voltage to earth, and as required by a), b), or c).

NOTE – 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 will have a RATED voltage to earth.

- a) Measuring circuit TERMINALS that have a RATING for connection to voltages above 50 V a.c. or 120 V d.c., and for measurements within MEASUREMENT CATEGORY I shall be marked with the RATED voltage or the RATED current as applicable and with symbol 14 of table 1 (see also 5.4.1 aa) and bb)).
- b) Measuring circuit TERMINALS for measurements within MEASUREMENT CATEGORIES II, III and IV shall be marked with the RATED voltage or the RATED current as applicable and the relevant MEASUREMENT CATEGORY. The MEASUREMENT CATEGORY markings shall be: “CAT II”, “CAT III” or “CAT IV” as applicable.
- c) For measuring circuit TERMINALS that do not have a RATING for connection to voltages above 50 V a.c. or 120 V d.c., the RATED voltage or the RATED current, as applicable, shall be marked. Alternative markings are acceptable.

NOTE – Examples of acceptable indications that the inputs in all cases are intended to be less than 50 V a.c. or 120 V d.c. to earth 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;
- the marked intended function of the instrument (e.g. millivoltmeter or milliammeter).

Measuring circuit TERMINALS that are permanently connected and not ACCESSIBLE need not be marked (see 5.4.3 aa)). The MEASUREMENT CATEGORY and the RATED maximum WORKING VOLTAGE or RATED maximum current for such TERMINALS shall be stated in the equipment installation instructions (see 5.4.3).

Circuit TERMINALS (connectors) which are dedicated only for connection to specific TERMINALS of other equipment need not be marked, provided that there is a means for identifying these TERMINALS.

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.

Conformity is checked by inspection.

5.4.1 General

Add new items to the list:

- aa) information about the relevant MEASUREMENT CATEGORY if the measuring circuit has a RATING for MEASUREMENT CATEGORY II, III, or IV. (See 5.1.5.101).
- bb) for measuring circuits that do not have a RATING for MEASUREMENT CATEGORY II, III, or IV, a warning shall be given not to use the equipment for measurements within other MEASUREMENT CATEGORIES, and a detailed RATING, including the RATED transient overvoltages, shall be given in the documentation.

5.4.3 Equipment installation

Add a new item to the list:

- aa) for measuring circuit TERMINALS for voltage or current that are permanently connected and not ACCESSIBLE, information regarding the MEASUREMENT CATEGORY, RATED maximum WORKING VOLTAGE or RATED maximum current (see 5.1.5.101).

6 Protection against electric shock

This clause of Part 1 is applicable except as follows:

6.1.2 Exceptions iTeh STANDARD PREVIEW

Add a new item to the list: (standards.iteh.ai)

- aa) locking and screw-held type measuring TERMINALS, including TERMINALS which do not require the use of a TOOL. OSIST prEN 61010-2-030:2004

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6.5.2 PROTECTIVE BONDING e6beb3b42cbd/osist-pren-61010-2-030-2004

Replace the conformity statement with the following:

Conformity is checked as specified in 6.5.2.1 to 6.5.2.4 and 6.5.2.101.

6.5.2.2 PROTECTIVE CONDUCTOR TERMINAL

Replace h) ii) with the following h) ii):

- h) ii) The PROTECTIVE BONDING shall not be interrupted by any switching or interrupting device. Devices used for indirect bonding in test and measurement equipment (see 6.5.1.101) are permitted to be part of the PROTECTIVE BONDING.

Add a new subclause:

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:

- a) voltage limiting devices which become conductive when the voltage across them exceeds the relevant values of 6.3.2 a), with overcurrent protection to prevent breakdown of the device.

Conformity is checked by connecting the ACCESSIBLE conductive parts to the MAINS supply TERMINALS while the equipment is connected to the MAINS supply as in NORMAL USE. The

voltage between the ACCESSIBLE conductive parts and the PROTECTIVE CONDUCTOR TERMINAL shall not exceed the relevant values of 6.3.2 a). for more than 0,2 s.

- b) voltage-sensitive tripping devices which interrupt all poles of the MAINS supply, and connect the ACCESSIBLE conductive parts to the PROTECTIVE CONDUCTOR TERMINAL whenever the voltage across them reaches the relevant values of 6.3.2 a).

Conformity is checked by applying the relevant voltage of 6.3.2 a) between the ACCESSIBLE conductive parts and the PROTECTIVE CONDUCTOR TERMINAL. The tripping action shall take place within 0,2 s.

6.6.2 TERMINALS for external circuits

Add a new third paragraph:

Unmated measuring TERMINALS which can become HAZARDOUS LIVE when the maximum RATED voltage is applied shall not be ACCESSIBLE.

6.7 Insulation requirements

6.7.2 CLEARANCES

Add a new subclause:

6.7.2.101 CLEARANCES for measuring circuits

Measuring circuits are subjected to working voltages and transient stresses from the circuit to which they are connected during measurement or test. When the measuring circuit is used to measure MAINS, the transient stresses can be estimated by the location within the installation at which the measurement is performed. When the measuring circuit is used to measure any other electrical signal, the transient stresses must be considered by the user to assure that they do not exceed the capabilities of the measuring equipment.

NOTE – When the measuring circuit is used to connect to MAINS, there is a risk of arc flash explosion. MEASUREMENT CATEGORIES define the amount of energy available, which may contribute to arc flash. In conditions where arc flash exists, additional precautions identified by the manufacturer to reduce the HAZARD related to shock and burn from arc flash are required within the user documentation. Also see Annex AA.

For equipment intended to be powered from the circuit being measured, CLEARANCES of the MAINS CIRCUIT shall be designed according to the requirements of the RATED MEASUREMENT CATEGORY, but overvoltage limiting devices may be used to reduce the transients to a level consistent with a lower MEASUREMENT CATEGORY. (See 14.9.) See 5.1.5.2 and 5.1.5.101 for additional markings requirements.

- a) CLEARANCES for MEASUREMENT CATEGORY I shall be calculated according to 6.7.2.4.
- b) CLEARANCES for MEASUREMENT CATEGORY II, III and IV are specified in Table 101.

Table 101 – CLEARANCES for MEASUREMENT CATEGORIES II, III and IV

Nominal a.c. or d.c. line-to-neutral voltage of MAINS being measured	BASIC INSULATION or SUPPLEMENTARY INSULATION		
	MEASUREMENT CATEGORY		
	II	III	IV
V	mm	mm	mm
≤50	0,04	0,1	0,5
>50 ≤100	0,1	0,5	1,5
>100 ≤150	0,5	1,5	3,0
>150 ≤300	1,5	3,0	5,5
>300 ≤600	3,0	5,5	8
>600 ≤1 000	5,5	8	14

NOTE – The values for DOUBLE INSULATION or REINFORCED INSULATION shall be twice the values for BASIC INSULATION.

c) CLEARANCES for homogenous construction are specified in 6.7.2.5 of Part 1.

6.9 Constructional requirements for protection against electric shock

Add a new subclause:

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6.9.101 Over-range indication

If a HAZARD could arise from an OPERATOR'S reliance on the value (for example, voltage) displayed by the equipment, the display shall give an unambiguous indication whenever the value is above the maximum positive value or below the minimum negative value of the range to which the instrument is set.

NOTE – Examples of HAZARDOUS indications include the following, unless there is a separate unambiguous indication of an over-range value:

- analogue meters with stops at the exact ends of the range;
- digital meters which show a low value when the true value is above the range maximum (for example 1 001,5 V displayed as 001,5 V);
- chart recorders which print a trace at the edge of the chart, thus indicating a value at the range maximum when the true value is higher.

Conformity is checked by inspection and, in case of doubt, by provoking an over-range value.

7 Protection against mechanical HAZARDS

This clause of Part 1 is applicable.

8 Mechanical resistance to shock and impact

This clause of Part 1 is applicable.

9 Protection against the spread of fire

This clause of Part 1 is applicable.

10 Equipment temperature limits and resistance to heat

This clause of Part 1 is applicable.

11 Protection against HAZARDS from fluids

This clause of Part 1 is applicable.

12 Protection against radiation, including laser sources, and against sonic and ultrasonic pressure

This clause of Part 1 is applicable.

13 Protection against liberated gases, explosion and implosion

This clause of Part 1 is applicable.

14 Components

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This clause of Part 1 is applicable, except as follows:

14.9 Circuits or components used as transient overvoltage limiting devices

Add the following new subclause.

14.9.101 Transient overvoltage limiting devices in measuring circuits

14.9.101.1 General

If control of transient overvoltage is employed in the measuring circuit, any overvoltage limiting component or circuit shall withstand 10 positive and 10 negative impulses with the applicable impulse withstand voltage of Table 102, spaced up to 1 min apart, from a 1,2/50 μ s impulse generator (see IEC 60060). The generator shall produce an open circuit voltage waveform of 1,2/50 μ s, a short-circuit current waveform of 8/20 μ s, with an output impedance (peak open-circuit voltage divided by peak short-circuit current) of 2 Ω for MEASUREMENT CATEGORY III and IV, and of 12 Ω for MEASUREMENT CATEGORY II.

Conformity is checked by the above test. After the test there shall be no sign of overload, nor degradation of performance of a component.

NOTE – Circuits or components used to control the temporary overvoltages described in IEC 60364-4-442 cannot be tested by the above test.

Table 102 – Impulse withstand voltages

Nominal a.c. or d.c. line- to-neutral voltage of MAINS supply V	Specified impulse withstand voltage		
	MEASUREMENT CATEGORY		
	II V	III V	IV V
50	500	800	1 500
100	800	1 500	2 500
150	1 500	2 500	4 000
300	2 500	4 000	6 000
600	4 000	6 000	8 000
1 000	6 000	8 000	12 000

14.9.101.2 Varistors

Varistors in measuring circuits shall either:

- be used in such a manner that a fuse or an impedance will limit energy dissipation in the varistor to a level consistent with the manufacturer's RATINGS,
- or if that is not possible, then varistors shall be physically mounted in such a way that no HAZARD can arise in the event that the device ruptures or overheats. If a rupture occurs, no part of a varistor shall bridge safety relevant insulations. If a varistor overheats, it shall not heat other materials to their ignition points.

NOTE 1 – When a varistor fails, it will rupture unless current is limited by a fuse or impedance. If the varistor ruptures, then it is necessary to assure that no expelled part could bridge other insulations and introduce other faults.

Varistors used between measuring circuits and earth shall be used in series with a gas-filled surge arrester.

NOTE 2 – A characteristic of varistors is that ageing and frequent use decrease their impedances, increasing current flow through the part into the protective conductor. Account should be taken of this characteristic when designing the equipment for long life.

Selection of the varistor shall take into account the estimated surge current, energy absorption, and their repetition rates, as well as the average power dissipation.

Conformity is checked by inspection of the circuit diagram, the method in which the varistor is installed in the equipment, and a comparison of the estimated surge current, energy absorption, and average power dissipation against the characteristics of the selected varistor.

15 Protection by interlocks

This clause of Part 1 is applicable.