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Metode merjenja toka dotika in toka v zaščitnem vodniku

Methods of measurement of touch current and protective conductor current

Verfahren zur Messung von Berührungsstrom und Schutzleiterstrom

Méthodes de mesure du courant de contact et du courant dans le conducteur de protection

Ta slovenski standard je istoveten z: **EN 60990:2016**

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17.220.20	Merjenje električnih in magnetnih veličin	Measurement of electrical and magnetic quantities

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Methods of measurement of touch current and protective conductor current (IEC 60990:2016)

Méthodes de mesure du courant de contact et du courant dans le conducteur de protection (IEC 60990:2016)

Verfahren zur Messung von Berührungsstrom und Schutzleiterstrom (IEC 60990:2016)

This European Standard was approved by CENELEC on 2016-07-04. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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European foreword

The text of document 108/630/FDIS, future edition 3 of IEC 60990, prepared by IEC/TC 108 "Safety of electronic equipment within the field of audio/video, information technology and communication technology" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 60990:2016.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2017-04-04
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2019-07-04

This document supersedes EN 60990:1999

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Endorsement notice

The text of the International Standard IEC 60990:2016 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 60065	NOTE	Harmonized as EN 60065.
IEC 60309-1:1999	NOTE	Harmonized as EN 60309-1:1999 (not modified).
IEC 60335-1	NOTE	Harmonized as EN 60335-1.
IEC 60364-1	NOTE	Harmonized as HD 60364-1.
IEC 60364-4-41:2005	NOTE	Harmonized as HD 60364-4-41:2007 (modified).
IEC 60601-1	NOTE	Harmonized in EN 60601-1 series.
IEC 60950-1	NOTE	Harmonized as EN 60950-1.
IEC 61010-1	NOTE	Harmonized as EN 61010-1.
IEC 62368-1	NOTE	Harmonized as EN 62368-1.

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE 1 When an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

Publication	Year	Title	EN/HD	Year
IEC/TS 60479-1	2005	Effects of current on human beings and livestock - Part 1: General aspects	-	-
IEC/TS 60479-2	2007	Effects of current on human beings and livestock - Part 2: Special aspects	-	-
IEC 61140	-	Protection against electric shock - Common aspects for installation and equipment	EN 61140	-
ISO/IEC Guide 51	2014	Safety aspects - Guidelines for their inclusion in standards	-	-
IEC Guide 104	2010	The preparation of safety publications and the use of basic safety publications and group safety publications	-	-

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INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Methods of measurement of touch current and protective conductor current

Méthodes de mesure du courant de contact et du courant dans le conducteur de protection

INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMISSION ELECTROTECHNIQUE INTERNATIONALE

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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METHODS OF MEASUREMENT OF TOUCH CURRENT AND PROTECTIVE CONDUCTOR CURRENT

FOREWORD

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International Standard IEC 60990 has been prepared by TC 108: Safety of electronic equipment within the field of audio/video, information technology and communication technology.

This third edition cancels and replaces the second edition published in 1999. It constitutes a technical revision.

The principal changes in this edition as compared with the second edition are as follows:

– the effects names have been updated to reflect increased understanding of the range of effects and is in concert with present usage;
– the conditions of use invoking a GRIPPABLE PART have been reduced in the application of the requirements based upon the current understanding of this effect;
– the references to ISO 10012-1, which has been replaced by management standard of the same number, have been replaced with explanatory text, where needed to maintain the sense of the document;

– former informative Annex H (GRIPPABLE PART) has been deleted from this update as it does not properly represent the full set of conditions under which immobilization can occur. A new informative Annex H (Analysis of frequency filtered touch current circuits measurement) has been added;

– the Bibliography (formerly Annex M) has been updated with additional references for completeness.

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

FDIS	Report on voting
108/630/FDIS	108/640/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 publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

In this standard, the following print types or formats are used:

– requirements proper and normative annexes: in roman type;

– compliance statements and test specifications: *in italic type*;

– notes/explanatory matter: in smaller roman type;

– normative conditions within tables: in smaller roman type;

– terms defined in Clause 3: SMALL CAPITALS.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result 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.

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.

INTRODUCTION

This International Standard was developed as a response to concerns arising from the advent of electronic switching techniques being broadly applied to power systems and within EQUIPMENT, giving rise to high-frequency harmonic voltages and currents.

This standard is intended for the guidance of EQUIPMENT committees in preparing or amending the test specifications in their standards for measurement of leakage current. However the term "leakage current" is not used for reasons explained below.

This standard was initially prepared under the basic safety function assigned to TC 74 (now TC 108), as follows:

Methods of measuring leakage current

This includes, for various types of EQUIPMENT, all aspects of what is referred to as "leakage current", including methods of measurement of current with regard to physiological effects and for installation purposes, under normal conditions and under certain fault conditions.

The methods of measurement of leakage current described herein result from the review of IEC TS 60479-1 and other publications, including descriptions of earlier methods of measurement.

The following conclusions were derived from a review of the effects of leakage current:

– the primary concern for safety involves possible flow of harmful current through the human body (this current is not necessarily equal to the current flowing through a protective conductor);
– the effect of electric current on a human body is found to be somewhat more complex than was assumed during the development of earlier standards in that there are several body responses which should be considered. The most significant responses for setting limits for continuous waveforms are
  - perception,
  - startle-reaction,
  - letgo-immobilization, and
  - ELECTRIC BURN.

Each of these four body responses has a unique threshold level. There are also significant differences in the manner in which some of these thresholds vary with frequency.

Two types of current have been identified as needing separate measuring methods: TOUCH CURRENT and PROTECTIVE CONDUCTOR CURRENT.

TOUCH CURRENT only exists when a human body or a body model is a current pathway.

It was also noted that the term "leakage current" has already been applied to several different concerns: TOUCH CURRENT, PROTECTIVE CONDUCTOR CURRENT, insulation properties, etc. Therefore, in this standard, the term "leakage current" is not used.

Measurement of TOUCH CURRENT

In the past, EQUIPMENT standards have used two traditional techniques for measurement of leakage current. Either the actual current in the protective conductor was measured, or a simple resistor-capacitor network (representing a simple body model) was used, the leakage current being defined as the current through the resistor.

This standard provides measuring methods for the four body responses to the electric current noted above, using a more representative body model.

This body model was chosen for most common cases of electric shock in the general sense. With respect to the path of current flow and conditions of contact, a body model approximating full hand-to-hand or hand-to-foot contact in normal conditions is used. For small areas of contact (for example, small, finger contact), a different model may be appropriate but is not covered here.

Of the four responses, startle-reaction and letgo-immobilization are related to the peak value of TOUCH CURRENT and vary with frequency. Traditionally, concerns for electric shock have dealt with sinusoidal waveforms, for which r.m.s. measurements are most convenient. Peak measurements are more appropriate for non-sinusoidal waveforms where significant values of TOUCH CURRENT are expected, but are equally suitable for sinusoidal waveforms. The networks specified for the measurement of startle-reaction and letgo-immobilization are frequency-responsive and are so weighted that single limit power-frequency values can be specified and referenced.

ELECTRIC BURNS, however, are related to the r.m.s. value of TOUCH CURRENT, and are relatively independent of frequency. For EQUIPMENT where ELECTRIC BURNS may be of concern (see 7.2), two separate measurements are made, one in peak value for electric shock and a second in r.m.s. value for ELECTRIC BURNS each using the appropriate test circuit.

EQUIPMENT committees should decide which physiological effects are acceptable and which are not, and then decide on limit values of current. Committees for certain types of EQUIPMENT may adopt simplified procedures based upon this standard. A discussion of limit values, based upon earlier work by various IEC EQUIPMENT committees, is provided in Annex D.

Measurement of PROTECTIVE CONDUCTOR CURRENT

In certain cases, measurement of the PROTECTIVE CONDUCTOR CURRENT of EQUIPMENT under normal operating conditions is required. Such cases include:

– selection of a residual current protection device,
– determination when a high integrity protective earth circuit is required,
– prevent excessive PROTECTIVE CONDUCTOR CURRENT overload in the electrical installation.

The PROTECTIVE CONDUCTOR CURRENT is measured by inserting an ammeter of negligible impedance in series with the EQUIPMENT protective earthing conductor.