



SLOVENSKI STANDARD

SIST EN 60555-3:1995

01-april-1995

Disturbances in supply systems caused by household appliances and similar electrical equipment - Part 3: Voltage fluctuations

Disturbances in supply systems caused by household appliances and similar electrical equipment -- Part 3: Voltage fluctuations

Rückwirkungen in stromversorgungsnetzen, die durch Haushaltegeräte und durch ähnliche Einrichtungen verursacht werden - Teil 3: Spannungsschwankungen

Perturbations produites dans les réseaux d'alimentation par les appareils électrodomestiques et les équipements analogues -- Partie 3: Fluctuations de tension

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ICS:

29.240.01	Omrežja za prenos in distribucijo električne energije na splošno	Power transmission and distribution networks in general
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EUROPEAN STANDARD

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NORME EUROPEENNE

Part 3

EUROPAISCHE NORM

April 1987

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ENGLISH VERSION

DISTURBANCES IN SUPPLY SYSTEMS CAUSED BY HOUSEHOLD APPLIANCES AND SIMILAR ELECTRICAL EQUIPMENT
PART 3 : VOLTAGE FLUCTUATIONS
(IEC 555-3 (1982 - 1st edition))

Perturbations produites dans Les réseaux d'alimentation par Les appareils électrodomestiques et Les équipements analogues
Troisième partie: Fluctuations de tension

Rückwirkungen in Stromversorgungsnetzen, die durch Haushaltgeräte und durch ähnliche Einrichtungen verursacht werden
Teil 3: Spannungsschwankungen

(CEI 555-3 (1982 - 1ère édition))

(IEC 555-3 (1982 - 1. Ausgabe))

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CENELEC

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

Central Secretariat: rue Bréderode 2, B-1000 Brussels

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BRIEF HISTORY

The CENELEC Questionnaire Procedure performed for finding out whether or not IEC 555-3 (first edition, 1982) could be accepted without textual changes, has shown that no common modifications were necessary for the acceptance as a European Standard (EN). The Reference Document was submitted to the CENELEC members for vote and acceptance by CENELEC.

TECHNICAL TEXT

The text of the International Standard IEC 555-3 (first edition, 1982) was approved by CENELEC on 27 February 1986 as a European Standard.

The following dates were fixed for the EN:

doa: 1986-12-01
dop/dow: 1987-06-01

Note: EN 60 555 Part 1, Part 2 and Part 3 supersedes EN 50 006.

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**NORME
INTERNATIONALE
INTERNATIONAL
STANDARD**

**CEI
IEC
555-3**

Première édition
First edition
1982

**Perturbations produites dans les réseaux
d'alimentation par les appareils électro-
domestiques et les équipements analogues**

**Troisième partie:
Fluctuations de tension**

ITeT STANDARD PREVIEW

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**Disturbances in supply systems
caused by household appliances
and similar electrical equipment**

**Part 3:
Voltage fluctuations**

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International Electrotechnical Commission
Международная Электротехническая Комиссия

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CONTENTS

	Page
FOREWORD	5
PREFACE	5
INTRODUCTION	7
Clause	
1. Scope	7
2. Object	9
3. Definitions	9
4. Types of voltage fluctuation waveform	13
5. Test conditions	13
6. Assessment of voltage fluctuations	17
APPENDIX A – Calculation and measurement	27
APPENDIX B – Standard characteristics for flickermeters (<i>under consideration</i>)	35
FIGURES	36

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**DISTURBANCES IN SUPPLY SYSTEMS CAUSED BY HOUSEHOLD
APPLIANCES AND SIMILAR ELECTRICAL EQUIPMENT****Part 3: Voltage fluctuations**

FOREWORD

- 1) The formal decisions or agreements of the IEC on technical matters, prepared by the Technical Committees on which all the National Committees having a special interest therein are represented, express, as nearly as possible, an international consensus of opinion on the subjects dealt with.
- 2) They have the form of recommendations for international use and they are accepted by the National Committees in that sense.
- 3) In order to promote international unification, the IEC expresses the wish that all National Committees should adopt the text of the IEC recommendation for their national rules in so far as national conditions will permit. Any divergence between the IEC recommendation and the corresponding national rules should, as far as possible, be clearly indicated in the latter.

PREFACE

This standard has been prepared by IEC Technical Committee No. 77: Electromagnetic Compatibility between Electrical Equipment Including Networks.

A first draft was discussed at the meeting held in The Hague in 1979. As a result of this meeting, a draft, Document 77(Central Office)8, was submitted to the National Committees for approval under the Six Months' Rule in July 1980.

Amendments, Document 77(Central Office)16, were submitted to the National Committees for approval under the Two Months' Procedure in November 1981.

The National Committees of the following countries voted explicitly in favour of publication:

Australia	Korea (Republic of)
Austria	Netherlands
Belgium	New Zealand
Canada	Norway
Egypt	Poland
Finland	Romania
France	South Africa (Republic of)
German Democratic Republic	Sweden
Germany	Turkey
Hungary	Union of Soviet
Ireland	Socialist Republics
Israel	United Kingdom
Italy	Yugoslavia
Japan	

Other IEC publications quoted in this standard:

Publications Nos. 50: International Electrotechnical Vocabulary (I.E.V.).

725: Considerations on Reference Impedances for Use in Determining the Disturbance Characteristics of Household Appliances and Similar Electrical Equipment:

DISTURBANCES IN SUPPLY SYSTEMS CAUSED BY HOUSEHOLD APPLIANCES AND SIMILAR ELECTRICAL EQUIPMENT

Part 3: Voltage fluctuations

INTRODUCTION

This standard is one of a series which deals with disturbances in supply systems caused by household appliances and similar electrical equipment.

This series has the three following parts:

Part 1: Definitions (IEC Publication 555-1).

Part 2: Harmonics (IEC Publication 555-2).

Part 3: Voltage fluctuations (IEC Publication 555-3).

Household appliances and similar electrical equipment, having electronic or electro-mechanical control devices, may produce voltage fluctuations in the supply systems to which they are connected.

A combination of large current variations and high supply system impedance can cause excessive changes of supply voltage. If excessive voltage changes are repeated at short intervals of time, objectionable fluctuations of luminance (flicker) will be produced in illumination sources connected to the same supply network. Some examples of voltage changes are given in Figures 1 and 2, page 36.

Voltage fluctuations produced by an appliance should not adversely affect lighting equipment on the same supply system.

1. Scope

This standard is applicable to electrical and electronic equipment for household and similar use, intended to be connected to low-voltage a.c. distribution systems of the following types:

- nominal voltages up to 240 V, single-phase, two or three wire;
- nominal voltages up to 415 V, three-phase, three or four wire;
- nominal frequency 50 Hz or 60 Hz.

Examples of electrical equipment to which this standard applies are appliances for cooking and heating, motor-operated or magnetically driven appliances, and portable tools.

This standard is not applicable to:

- equipment subject to notification to or consent by the supply authority before connection to the system (consent by the supply authority may be requested for high-power appliances which are intended to be used only in systems having impe-

dances considerably lower than the reference impedance. General consent may be declared for use of a type of appliance in a defined part of the supply system):

- equipment intended exclusively for professional purposes;
- appliances and equipment without automatic control means;
- appliances producing less than one voltage change per hour;
- appliances producing more than 1 800 voltage changes per minute;
- disturbances caused by manual switching.

2. Object

The object of this standard is to specify:

- a) limits of voltage fluctuations which may be produced by an individual appliance, when tested under specified conditions;
- b) methods of test and calculation.

Note. — These requirements should not be confused with requirements relating to the quality of the supply connected to the consumer.

3. Definitions

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3.1 Control system

A combination of control apparatus or devices co-ordinated to execute a planned set of controls, or to maintain a pre-set value.

3.2 Programme (program) (of a control system)

A set of command and information signals necessary for the achievement of a specific sequence of operations.

3.3 Waveform (I.E.V. 101-05-04)

A representation of the local or the instantaneous value of a function defining the wave.

3.4 Cycle (I.E.V. 101-04-13)

The complete range of states or of values through which a phenomenon or a set of quantities passes in a given repeatable order.

3.5 Cycle of operation (I.E.V. 151-03-03)

A series of operations that may be repeated at will or automatically.

3.6 Reference impedance

A conventional impedance used to calculate or measure the disturbance caused by an appliance.

3.7 *Harmonic (component)* (I.E.V. 101-04-39)

A component of order greater than 1 of the Fourier series of a periodic quantity.

3.8 *(Total) harmonic distortion* (I.E.V. 101-04-43)

The ratio of the r.m.s. value of the harmonic content to the r.m.s. value of the alternating quantity.

3.9 *Voltage change* (see Figure 2, page 36)

A variation of the r.m.s. (or peak) value of the supply voltage between two adjacent levels each of which is sustained for definite but unspecified times.

3.10 *Magnitude of a voltage change* (see Figure 2)

The difference between the r.m.s. (or peak) values of the voltage, before and after a voltage change.

3.11 *Relative voltage change* (see Figure 2)

The ratio of the magnitude of a voltage change to a specified value of the voltage.

3.12 *Duration of a voltage change* (see Figures 1 and 2, page 36)

Interval of time for the voltage to increase or decrease from the initial value to the final value.

3.13 *Voltage change interval* (see Figure 2)

Interval of the time which elapses from the beginning of one voltage change to the beginning of the next voltage change.

3.14 *Voltage fluctuation* (see Figures 1 and 2)

A series of voltage changes or a cyclical variation of the voltage envelope.

3.15 *Sinusoidal voltage fluctuation* (see Figure 1)

Voltage fluctuation of which the fluctuation waveform is sinusoidal.

3.16 *Magnitude of a voltage fluctuation* (see Figures 1 and 2)

During a voltage fluctuation, the difference between the maximum and minimum values of voltage.

3.17 *Rate of occurrence of voltage changes*

The number of voltage changes occurring per unit of time.

Note. — This should not be confused with the number of cycles per second at the mains supply voltage. The term "fluctuations per second" should not be used.

3.18 *Flicker*

Subjective impression of fluctuating luminance.

Note. — The term "flicker" should not be used instead of "voltage fluctuation".

3.19 Flickermeter

Instrument designed to measure quantities related to luminance fluctuation.

4. Types of voltage fluctuation waveform

There are various types of voltage fluctuation, requiring the use of different assessment methods.

For the purpose of this standard, voltage fluctuation waveforms are classified as follows:

Type a): periodic rectangular voltage changes of equal magnitudes (e.g. switching of single resistive loads) (see Figure 3a, page 37);

Type b): a series of step changes of voltage which are irregular in time. Their magnitudes may be equal or not, and in either the negative or positive direction (e.g. switching of multiple loads) (see Figure 3b, page 37);

Type c): clearly separated voltage changes which are not all step changes (e.g. switching of non-resistive loads) (see Figure 3c, page 37);

Type d): a series of random or continuous voltage fluctuations (e.g. cyclic or randomly changing loads) (see Figure 3d, page 37).

Note that two or more changes in the same direction occurring in a total period of not more than 30 ms are considered to be a single change (see Figure 5, page 40).

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The type of voltage fluctuation may be deduced from the characteristics of the appliance, or observed by instrumentation.

5. Test conditions

Tests made to show compliance with the limits are type tests.

5.1 Appliance

One appliance may have several separately controlled circuits. Each circuit is considered as a single appliance if it is intended to be used independently, provided that the controls are not synchronized to switch at the same instant, other than where:

- a) this occurs at random;
- b) this occurs through the use of a time-switch;
- c) the synchronization is arranged to switch one load off at the same time as another is switched on.

Several circuits intended to be used independently may be controlled by automatic synchronized switching, provided that the combined load does not produce voltage fluctuations exceeding the limits given in Clause 6.