BRITISH STANDARD

BS 5406-1: 1988
EN 60 555-1: 1987
IEC 555-1: 1982

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

Part 1: Glossary of terms —

[EN title: Part 1: Definitions]

The European Standard EN 60 555-1 has the status of a British Standard

UDC 621.391.823:64.06 – 83(083.71)

Cooperating organizations

The European Committee for Electrotechnical Standardization (CENELEC), under whose supervision this European Standard was prepared, comprises the National Committees of the following countries.

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Contents

National foreword

This part of BS 5406 has been prepared under the direction of the General Electrotechnical Engineering Standards Committee and is the English language version of EN 60 555-1 which is identical with IEC Publication 555-1:1982. Together with Part 2 *"Specification of harmonics"*, and Part 3 *"Specification of voltage fluctuations"*, it supersedes BS 5406:1976 [EN 50 006] which is withdrawn.

Page numbering. Attention is drawn to the fact that the page numbers quoted in the text of EN 60 555-1 in relation to the figures are the page numbers of IEC Publication 555-1. These page references do not correspond to the EN page numbers. All the figures can be found on EN pages 11 to 13.

Cross-references. The British Standard corresponding to the International Electrotechnical Vocabulary is BS 4727 *"Glossary of electrotechnical, power, telecommunication, electronics, lighting and colour terms"*. However, no detailed cross-reference between the definitions in the IEV and those in BS 4727 is necessary since the definitions are given *in extenso* in this standard.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the EN title page, pages 2 to 10, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 60 555-1

April 1987

UDC: 621.391.823:64.06 – 83(083.71)

Key words: Electromagnetic compatibility; disturbances; household electrical appliances; definitions

English version

Disturbances in supply systems caused by household appliances and similar electrical equipment Part 1: Definitions

[IEC 555-1 (1982 — 1st edition)]

Perturbations produites dans les réseaux d'alimentation par les appareils électrodomestiques et les équipements analogues
Première partie: Définitions
[CEI 555-1 (1982 — 1ère édition)]

Rückwirkungen in Stromversorgungsnetzen, die durch Haushaltgeräte und durch ähnliche elektrische Einrichtungen verursacht werden
Teil 1: Begriffe
[IEC 555-1 (1982 — 1.Ausgabe)]

This European Standard was ratified by CENELEC on 27 February 1986. CENELEC members are bound to comply with the requirements of the 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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CENELEC

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

Central Secretariat: rue Bréderode 2, B-1000 Brussels

Brief history

The CENELEC Questionnaire Procedure performed for finding out whether or not IEC 555-1 (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 555-1 (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 60 555-1, EN 60 555-2 and EN 60 555-3 supersedes EN 50 006.

Contents

1 Scope and object

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

This series will consist of three parts:

— *Part 1: Definitions (IEC Publication 555-1);*

— *Part 2: Harmonics (IEC Publication 555-2);*

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

2 General terms

2.1 Electromagnetic compatibility

The ability of a device to function satisfactorily in its electromagnetic environment without introducing intolerable disturbances to that environment or to other devices therein.

2.2 Input (or output) power control

The methods and means of regulating the electric energy supplied to (or from) an apparatus, machine or system to achieve required performance.

2.3 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.

2.4 Cyclic on/off switching control

An input power control which operates to switch the supply to the equipment on and off in a repetitive manner.

NOTE In a cyclic switching control system, electromechanical or electronic switches can be used.

2.5 Programme (program) (of a control system)

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

2.6 Multicycle control

The process of varying the ratio of the number of half-cycles of current conduction to the number of half cycles of non-conduction.

NOTE The various combinations of times of conduction and non-conduction enable, for example, the average power supplied to the controlled load to be varied.

2.6.1 *Synchronous multicycle control*

Multicycle control in which the starting instants of the operating intervals are synchronized with respect to the line voltage.

NOTE 1 For resistive loads, the starting instant is normally at voltage zero and current flows for an integral number of complete half-cycles.

This is sometimes known as "Burst firing control" and should not be confused with a firing technique for thyristors in which a burst or train of trigger pulses is applied.

NOTE 2 Figure 1 shows an idealized example of the current supplied to a resistive single-phase load controlled according to this principle.

2.7 Generalized phase control (for example, see Figure 2)

The process of varying, within the cycle (or half-cycle) of the supply voltage, the time interval or intervals during which current conduction occurs.

2.7.1 *Phase control*

The process of varying, within the cycle (or half-cycle) of the supply voltage, the instant at which current conduction begins. In this process the conduction ceases at or about the passage of current through zero.

NOTE 1 Phase control is a particular case of generalized phase control.

NOTE 2 Variation of the instant at which current conduction begins (variation of the delay angle) makes it possible to vary the power supplied to a connected load.

NOTE 3 Figure 2d shows an idealized example of the current supplied to a resistive single-phase load under symmetrical phase control.

2.8 Delay angle (I.E.V. 551-05-29)

The time expressed in angular measure by which the starting instant of current conduction is delayed by phase control.

NOTE The delay angle can be either constant or variable and is not necessarily intended to be the same for positive and negative half-cycles.

2.9 Symmetrical control (single-phase)

Control by a device designed to operate in an identical manner on the positive and negative half-cycles of an alternating voltage or current.

NOTE If the positive and negative half-waves of the input source have the same form and amplitude:

a) Generalized phase control is symmetrical if the current waveform is the same for both positive and negative half-cycles.

b) Multicycle control is symmetrical if within each conduction period the number of positive and negative half-cycles is equal.

2.10 Asymmetrical control (single-phase)

Control by a device designed to operate in a different manner on the positive and negative half-cycles of an alternating voltage or current.

NOTE If the positive and negative half-waves of the input source have the same form and amplitude:

a) Generalized phase control is asymmetrical if the current waveform is not the same for both positive and negative half-cycles.

b) Multicycle control is asymmetrical if within each conduction period the number of positive and negative half-cycles is unequal.

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

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

2.12 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.

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

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

3 Impedances

3.1 Point of common coupling (P.C.C.) (of two or more loads) (see Figure 3)

The point of common coupling with other consumers is the point in the public supply network, electrically nearest to the consumer in whose installation the appliance is, or is to be, connected, at which other consumers' installations are, or may be, connected.

NOTE The P.C.C. may be at any point of the supply system but is usually considered to be the junction of Z_A and Z_B.

3.2 Supply system impedance (Z_A) (see Figure 3)

The system impedance up to the P.C.C. with other consumers.

3.3 Service connection impedance (Z_B) (see Figure 3)

The impedance of the connection from the P.C.C. with other consumers up to the point on the user's side of the metering point.

3.4 House wiring impedance (Z_C) (see Figure 3)

The impedance of the house wiring between the metering point and the socket-outlet.

3.5 Appliance impedance (Z_D) (see Figure 3)

The appliance impedance is the sum of two impedances: the flexible cord impedance between the socket-outlet and the appliance, and the internal wiring impedance.

3.6 Reference impedance

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

4 Harmonics

4.1 Fundamental (component) (I.E.V. 101-04-38)

The component of order 1 of the Fourier series of a periodic quantity.

NOTE For the purpose of this standard, the fundamental frequency is the frequency of the supply system.

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

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

4.3 Harmonic order (n) (I.E.V. 101-04-40)

The integral number given by the ratio of the frequency of a harmonic to the fundamental frequency.

NOTE For example, a harmonic, the frequency of which is twice the fundamental frequency, is called the second harmonic.

4.4 Harmonic ratio (of a harmonic component)

For a harmonic component of order n of a distorted wave, the ratio (which may be expressed as a percentage) of the r.m.s. value of this harmonic component to the r.m.s. value of the fundamental component of that same wave.

4.5 Harmonic content (I.E.V. 101-04-42)

The quantity obtained by subtracting the fundamental component from an alternating quantity.

4.6 (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.

4.7 Fundamental factor (I.E.V. 131-03-03) (of a non-sinusoidal alternating voltage or current)

The ratio of the r.m.s. value of the fundamental component to the r.m.s. value of the alternating quantity.

5 Voltage changes

NOTE For different purposes it may be necessary to consider changes of either the r.m.s. or the peak voltage. In the following definitions the word "voltage" shall be read as r.m.s. or peak as appropriate.

5.1 Voltage change (see Figure 5)

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.

5.2 Magnitude of a voltage change (see Figure 5)

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

5.3 Relative voltage change (see Figure 5)

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

5.4 Duration of a voltage change (see Figure 4 and Figure 5)

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

5.5 Voltage change interval (see Figure 5)

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

5.6 Voltage fluctuation (see Figure 4 and Figure 5)

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

5.7 Voltage fluctuation waveform (see Figure 4 and Figure 5)

For a voltage fluctuation, the form of the envelope of the peak voltage as a function of time.

5.8 Sinusoidal voltage fluctuation (see Figure 4)

Voltage fluctuation of which the fluctuation waveform is sinusoidal.

5.9 Magnitude of a voltage fluctuation (see Figure 4 and Figure 5)

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

5.10 Rate of occurrence of voltage changes

The number of voltage changes occurring per unit of time.

NOTE This must not be confused with the number of cycles per second at the mains supply voltage. The term "fluctuations per second" shall not be used.

6 Flicker

6.1 Flicker

Subjective impression of fluctuating luminance.

NOTE The term "flicker" shall not be used instead of "voltage fluctuation".

6.2 Flickermeter

Instrument designed to measure quantities related to luminance fluctuation.

6.3 Threshold of flicker perceptibility

The minimum fluctuating luminance which is perceptible to a specified sample of the population.

NOTE This may be a function of population activity, of the size and type of luminaire and other factors.

6.4 Threshold of flicker irritability

The maximum fluctuating luminance that can be tolerated without discomfort by a specified sample of the population.

NOTE This may be a function of population activity, of the size and type of luminaire and other factors.

6.5 Fusion frequency (I.E.V. 45-25-280)

Frequency of succession of retinal images above which their differences of luminosity or colour are no longer perceptible.

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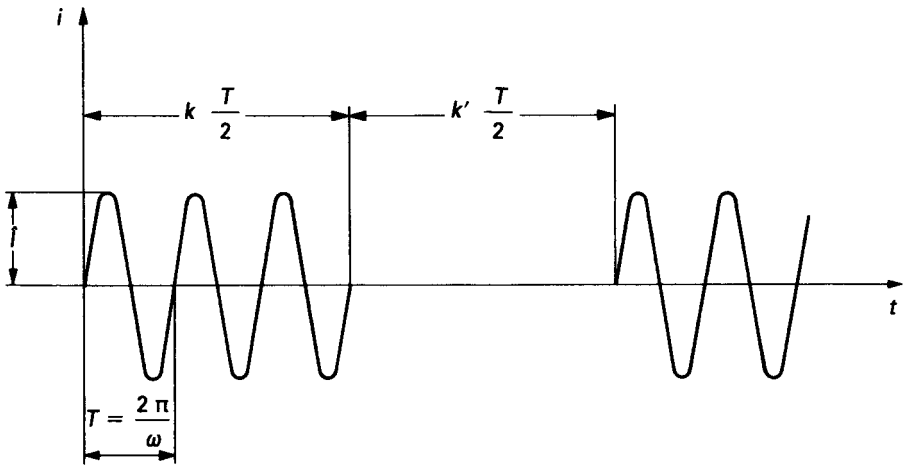


k and k': integers

Figure 1 — Synchronous multicycle control idealized current graph

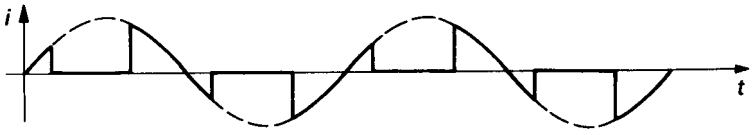


FIGURE 2a

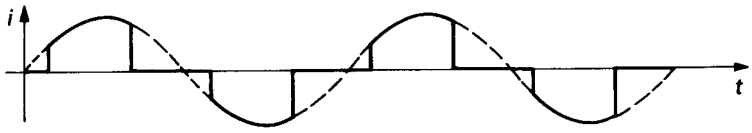


FIGURE 2b

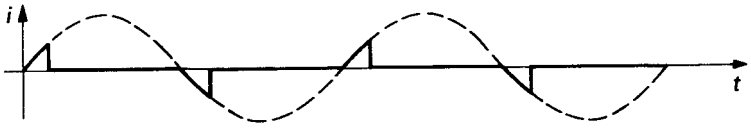


FIGURE 2c

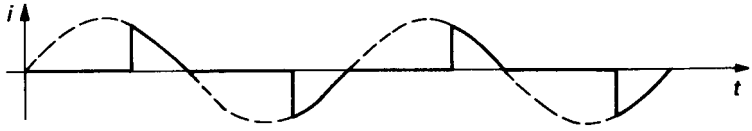


FIGURE 2d

Figure 2 — Generalized phase control. Idealized current waveform for a resistive load (examples)

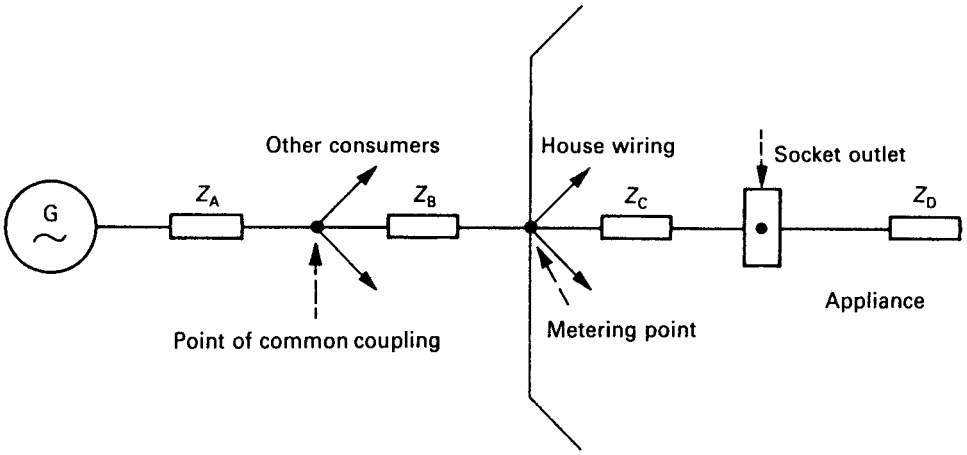
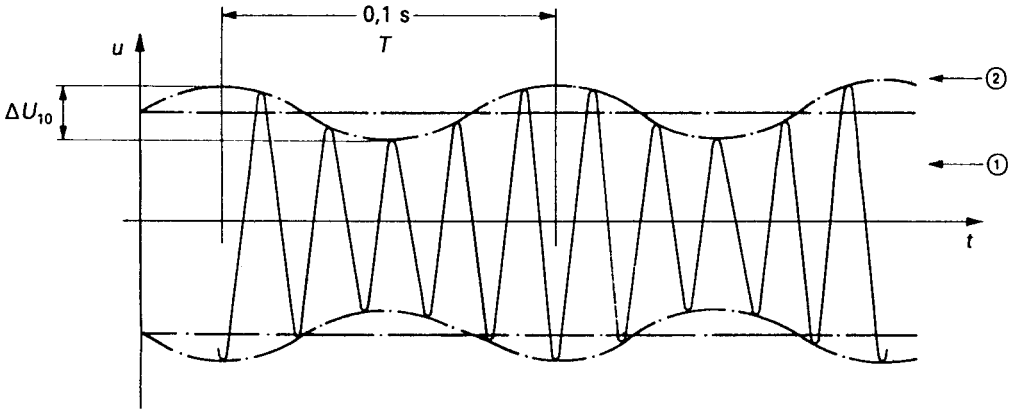


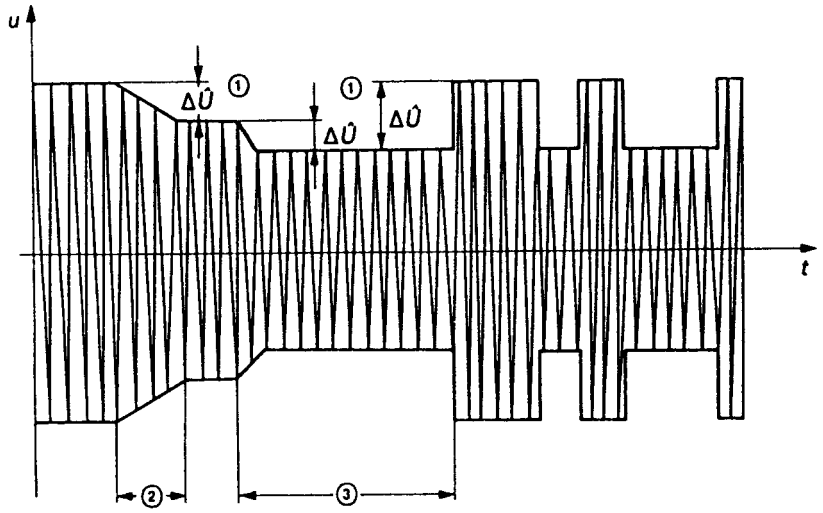
Figure 3 — Impedances diagram



① = instantaneous voltage
network frequency: 50 Hz

② = sinusoidal voltage fluctuation of
magnitude ΔU_{10}

Figure 4 — Sinusoidal voltage fluctuation of 10 Hz frequency



① = voltage change of magnitude ΔU

Note. — Seven voltage changes are shown on the figure.

② = duration of the voltage change

③ = voltage change interval

Figure 5 — Illustration of peak voltage changes

National appendix Z

The United Kingdom participation in the preparation of this European Standard was entrusted by the General Electrotechnical Engineering Standards Committee (GEL/-) to Technical Committee GEL/111, upon which the following bodies were represented:

Association of Manufacturers of Domestic Electrical Appliances
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Beama Interactive and Mains Systems Association (Bimsa)
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Association of Control Manufacturers — TACMA (BEAMA Ltd)
British Steel Corporation
Department of Trade and Industry — Electronics Applications Division
Electronic Components Industry Federation
Institution of Electrical Engineers

Publications referred to

See national foreword.

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