

Basic and safety principles for man-machine interface, marking and identification — Coding principles for indicators and actuators

The European Standard EN 60073:2002 has the status of a
British Standard

ICS 01.070; 29.020

National foreword

This British Standard is the official English language version of EN 60073:2002. It is identical with IEC 60073:2002. It supersedes BS EN 60073:1997 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee GEL/16, Terminal markings and other identifications, which has the responsibility to:

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English version

**Basic and safety principles for man-machine interface,
marking and identification -
Coding principles for indicators and actuators
(IEC 60073:2002)**

Principes fondamentaux et de sécurité
pour l'interface homme-machine,
le marquage et l'identification -
Principes de codage pour les indicateurs
et les organes de commande
(CEI 60073:2002)

Grund- und Sicherheitsregeln
für die Mensch-Maschine-Schnittstelle,
Kennzeichnung -
Codierungsgrundsätze für
Anzeigengeräte und Bedienteile
(IEC 60073:2002)

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CENELEC

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

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Foreword

The text of document 16/402/FDIS, future edition 6 of IEC 60073, prepared by IEC TC 16, Basic and safety principles for man-machine interface, marking and identification, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60073 on 2002-07-01.

This European Standard supersedes EN 60073:1996.

The following dates were fixed:

- latest date by which the EN has to be implemented
at national level by publication of an identical
national standard or by endorsement (dop) 2003-04-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2005-07-01

Annexes designated "normative" are part of the body of the standard.

Annexes designated "informative" are given for information only.

In this standard, annexes A and ZA are normative and annexes B and C are informative.

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 60073:2002 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following note has to be added for the standard indicated:

IEC 60204-1	NOTE	Harmonized as EN 60204-1:1997 (not modified).
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INTRODUCTION

This basic safety publication is intended for use by technical committees in the preparation of standards in accordance with the principles laid down in IEC Guide 104 and in ISO/IEC Guide 51.

It should be noted that one of the responsibilities of a technical committee is, wherever possible, to include or refer to the requirements of basic safety publications in standards for equipment within its scope. Consequently, the requirements of this basic safety publication apply only if they are included, or are referred to in those standards.

Supervision and intervention are the principal tasks of personnel engaged in the monitoring and control of equipment or processes.

Indicator for the representation of conditions, and actuating devices to enable intervention under normal and fault conditions, are essential to this purpose.

The information presented should meet the needs of the users for the monitoring and control tasks which they are required to perform, for example, in extensive industrial processes.

Safety and ergonomic aspects should also be taken into account. The use of only a single means of coding is often insufficient to ensure unambiguous representation of information.

Apart from an unambiguous marking of the indicating and actuating devices, there is a requirement for a clear and consistent system of coding.

The choice of a code will depend on the information which it is intended to impart. This may relate to the state of equipment (or part of it), to the condition of a process, and/or to the effects which this condition has on persons, property and the environment.

The user is required to decide on which of these criteria the coding for the relevant application is to be based.

BASIC AND SAFETY PRINCIPLES FOR MAN-MACHINE INTERFACE, MARKING AND IDENTIFICATION –

Coding principles for indicators and actuators

1 Scope

This International Standard establishes general rules for assigning particular meanings to certain visual, acoustic and tactile indications in order to

- increase the safety of persons, property and/or the environment through the safe monitoring and control of the equipment or process;
- facilitate the proper monitoring, control and maintenance of the equipment or process;
- facilitate the rapid recognition of control conditions and actuator positions.

This standard is for general application:

- from simple cases such as single indicator lights, push-buttons, mechanical indicators, light emitting diodes (LEDs) or video display screens to extensive control stations which may include a wide variety of devices for controlling an equipment or process;

NOTE Application of the general coding principles for displays on screens should be carried out without modification.

- where the safety of persons, property and/or the environment is involved, and also where the above-mentioned codes are used to facilitate the proper monitoring and controlling of equipment;
- where a particular kind of coding is to be assigned by a technical committee to a special function.

2 Normative references

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

IEC 60027 (all parts), *Letter symbols to be used in electrical technology*

IEC 60050(441), *International Electrotechnical Vocabulary (IEV) – Chapter 441: Switchgear, controlgear and fuses*

IEC 60050(721), *International Electrotechnical Vocabulary (IEV) – Chapter 721: Telegraphy, facsimile and data communication*

IEC 60050(845), *International Electrotechnical Vocabulary (IEV) Lighting*

IEC 60417 (all parts), *Graphical symbols for use on equipment*

IEC 60447, *Man-machine interface (MMI) – Actuating principles*

IEC 60617 (all parts), *Graphical symbols for diagrams*

IEC 61310-1, *Safety of machinery – Indication, marking and actuation – Part 1: Requirements for visual, auditory and tactile signals*

IEC Guide 104, *The preparation of safety publications and the use of basic safety publications and group safety publications*

ISO 3864, *Safety colours and safety signs*

ISO 7000, *Graphical symbols for use on equipment – Index and synopsis*

ISO 8201, *Acoustics – Audible emergency evacuation signal*

ISO 11429, *Ergonomics – System of auditory and visual danger and information signals*

ISO/IEC Guide 51, *Safety aspects – Guidelines for their inclusion in standards*

CIE (International Commission on Illumination): Publication No. 2-2 (TC 1.6), *Colours of light signals*

3 Definitions

For the purposes of this standard, the following definitions apply.

3.1

coding

systematic representation of specific signals or values by another set of signals, which has to conform to a definite set of rules

[IEC 61310-1: 1995, definition 3.22]

3.2

indicator

mechanical, optical or electrical device or a part of device providing visual, acoustic or tactile information

3.2.1

acoustic signal

message conveyed by means of tone, frequency and intermittency, emanating from a sound source

3.2.2

tactile signal

message conveyed by means of vibration, force, surface roughness, contour or position

3.2.3

visual signal

message conveyed by means of brightness, contrast, colour, shape, size or position

3.3

actuator

part of the actuating system which receives a human actuating action

[IEC 60447: 1993, definition 3.1]

NOTE For the purposes of this standard, the actuator in the case of an interactive screen display is considered to be that part of the screen display which represents the actuator function.

3.4

mechanical indicator

indicator which forms an integral part of a mechanical or electromechanical switching device (e.g. circuit-breaker) and which indicates whether it is in the OPEN or CLOSED position or an intermediate position (e.g. star position of a star-delta starter) but which is not intended as a manual actuator

3.5

man-machine interface (MMI)

parts of the equipment intended to provide a direct means of communication between the operator and the equipment, and which enable the operator to control and monitor the operation of the equipment

NOTE Such parts may include manually operated actuators, indicators and screens.

[IEC 60447: 1993, definition 3.3]

3.6

signal light

object or apparatus designed to emit a light signal

[IEV 845-11-05]

3.7

light emitting diode (LED)

solid-state device embodying a p-n junction, emitting optical radiation when excited by an electric current

[IEV 845-04-40]

3.8

illuminated actuator

actuator with an integrated light source giving visual indication by illumination. The operation of the light source may be related to or independent of the actuator action

3.9

hue

attribute of a visual sensation according to which an area appears to be similar to one of the perceived colours, red, yellow, green, and blue, or to a combination of two of them

[IEV 845-02-35]

3.10

brightness

attribute of a visual sensation according to which an area appears to emit more or less light

[IEV 845-02-28]

3.11**saturation**

chromaticness, colourfulness, of an area judged in proportion to its brightness

NOTE For given viewing conditions and at luminance levels within the range of photopic vision, a colour stimulus of a given chromaticity exhibits approximately constant saturation for all luminance levels, except when the brightness is very high.

[IEV 845-02-41]

3.12**contrast**

- a) In the perceptual sense: assessment of the difference in appearance of two or more parts of a field seen simultaneously or successively (*hence: brightness contrast, lightness contrast, colour contrast, simultaneous contrast, successive contrast, etc.*)
- b) In the physical sense: quantity intended to correlate with the perceived brightness contrast, usually defined by one of a number of formulae which involve the luminances of the stimuli considered, for example: $\Delta L/L$ near the luminance threshold, or L_1/L_2 for much higher luminances.

[IEV 845-02-47]

3.13**message**

group of characters and function control sequences which is transferred as an entity from a transmitter to a receiver, where the arrangement of the characters is determined at the transmitter

[IEV 721-09-01]

4 Coding principles**4.1 General**

Coding principles shall be established at an early stage of system design and shall be consistent with those used for other equipment within the same plant or process.

The choice of a certain code will depend on the tasks of the personnel and the associated service conditions in which these tasks have to be fulfilled.

It is recommended to apply one or more of the following means of indication coding:

Visual codes:

- by colour;
- by shape;
- by position;
- by changing characteristics over time (flashing).

Acoustic codes:

- by type of sound;
- by pure tone;
- by changing characteristic over time.

Tactile codes:

- by shape;

- by force;
- by vibration;
- by position;
- by changing characteristic over time.

Table 1 gives examples of these means of coding.

The meaning of the selected codes shall be unambiguous and shall be explained in the associated documentation of the particular equipment and/or the plant.

Table 1 – Means of coding

Means	Characteristic
Visual codes	
Colour	– Hue – Saturation – Brightness – Contrast
Shape	– Figure (alphanumeric, pictographs, graphical symbols, lines) – Form (character font, size, line width) – Texture (line type, shading, dotting)
Position	– Location (absolute, relative) – Orientation (with or without reference system)
Time	Changing over time (flashing): – Brightness – Colour – Shape – Position
Acoustic codes	
Type of sound	– Tone – Noise – Spoken message
Pure tone	– Selected frequency
Time	Change of – Frequency composition over time – Sound volume over time – Total duration
Tactile codes	
Shape	– Form – Surface roughness
Force	– Amplitude
Vibration	– Amplitude – Frequency
Position	– Location (absolute, relative) – Orientation (with or without reference system)
Time	Change of: – Force over time – Vibration over time