
**Ergonomics — Accessible design —
Indicator lights on consumer products**

*Ergonomie — Conception accessible — Voyants lumineux sur les
produits de consommation courante*

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Contents

	Page
Foreword	iv
Introduction	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Accessibility considerations related to indicator lights	2
4.1 Modes of lighting condition	2
4.2 Colour.....	3
4.3 Luminance	3
4.4 Size	5
4.5 Temporal luminance difference and blinking light frequency.....	5
4.6 Location.....	6
4.7 Alternative presentation of indicator light information.....	6
4.8 Marking of the indicator light meaning	7
4.9 Other factors	7
5 Conformance	7
Bibliography	8

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 159, *Ergonomics*, Subcommittee SC 4, *Ergonomics of human-system interaction*.

This first edition cancels and replaces ISO 24500:2010.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Indicator lights of consumer products provide important information to use products properly. Although their importance is recognized widely, many difficulties exist in relation to indicator lights such as insufficient on/off visibility, unclear implications of lighting modes, and discomforting glare are reported by users, particularly by older persons or persons with visual disabilities. These claims result from the lack of a relevant standard related to indicator lights design. This document is intended to provide design requirements and recommendations for adequate brightness, colour, and use of blinking lights of indicator lights considering the needs of older persons and persons with visual disabilities.

This document adopts the concepts of accessibility given in ISO/IEC Guide 71 and in ISO/TR 22411.

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Ergonomics — Accessible design — Indicator lights on consumer products

1 Scope

This document specifies design requirements and recommendations for indicator lights, mainly LED sourced, on consumer products for use by older people and people with visual disabilities. It does not consider the needs of persons who are blind.

Indicator lights include those that inform users visually about the conditions, changes in functional status and settings, and malfunction of products. They convey information by light on/off, time-modulated intensity, blinking, colour, luminance level, and layout.

This document addresses household and home appliances. It excludes electronic displays presenting characters and graphics, machinery, and appliances in special use for professional, technical, and industrial applications.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

ISO/IEC Guide 71, *Guide for addressing accessibility in standards*

ISO 17049, *Accessible design — Application of braille on signage, equipment and appliances*

CIE S 017, *ILV: International Lighting Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC Guide 71 and CIE S 017 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

3.1

consumer product

product that is intended to be acquired and used by an individual for personal rather than professional use

[SOURCE: ISO/TS 20282-2:2013, 4.3]

3.2

indicator light

light which is associated with the operation of a product and is indicative of the operation of a product

Note 1 to entry: Indicator light informs users about the conditions, changes in functional statuses and settings, or malfunction of products.

Note 2 to entry: Indicator light conveys information by light on/off, time-modulated intensity, blinking, colour, luminance level, and layout.

Note 3 to entry: Indicator light can have different shapes, e.g. circular, rectangular, triangular, or arrow shape.

Note 4 to entry: Indicator light includes lights with a light conductor or cover. It can be located on a control panel, labelled with text or an icon, or be an integral part of a control element.

3.3 small indicator light

indicator light emitting area that is smaller than 20' in diameter of the visual angle

Note 1 to entry: Visual angle of 20' corresponds to 3 mm length viewed at a 50 cm distance.

Note 2 to entry: Visual appearance of small indicator light smaller than 20' of visual angle changes in brightness and colour. According to the spatial summation of vision, brightness of a light smaller than 20' of visual angle changes proportionally with its size. Brightness of a light larger than 20' of visual angle is determined by luminance only. Colour for a smaller visual field than 20' also changes its appearance described small-field tritanopia, a kind of colour defect.

3.4 low vision

impairment of visual functioning even after treatment and/or standard refractive correction

Note 1 to entry: A person with low vision has a visual acuity of less than 6/18 to light perception, or a visual field less than 10 degrees from the point of fixation, but uses, or is potentially able to use, vision for the planning and/ or execution of a task for which vision is essential.

[SOURCE: Adapted from Low Vision Services or Care, WHO]

3.5 fundamental colour

set of basic colours perceived by people with normal colour vision, which are red, orange (yellow-red), yellow, green-yellow, green, blue-green, blue, purple-blue, purple, red-purple, black, grey, and white

Note 1 to entry: Black and grey are not applicable for luminous mode, such as indicator lights.

3.6 luminance

intensity of light emitted from a surface per unit area and per unit solid angle in a given direction

Note 1 to entry: More information of luminance is given in CIE S017.

3.7 control

device that directly responds to an action of the operator, e.g. by the operator applying pressure

[SOURCE: ISO 11064-5:2008, 3.8, modified — Note 1 to entry and the example have been omitted.]

4 Accessibility considerations related to indicator lights

4.1 Modes of lighting condition

Modes of the conditions of indicator lights shall be classified as follows. These modes shall be clearly recognizable by users.

- a) Light-on: Light-on mode is the steady luminous condition of an indicator light by electric current flow. The following are some examples of indications associated with the light-on mode:
- indication of running condition;
 - indication of standby status;
 - indication of connection to the power source;

- indication of next operation;
 - indication of recovery from malfunction to normal status.
- b) Light-off: light-off mode is the steady non-luminous condition without electric current flow. The following are some examples of indications associated with the light-off mode:
- indication of pause or standby;
 - indication of being disconnected from the power source.
- c) Blinking: Blinking mode is the repetition of light-on and light-off modes. It also includes clear periodical changes of the difference between the lighter and darker conditions. The following are some examples of indications associated with the blinking mode.
- indication of a change of status among normal, abnormal, standby and pause;
 - indication of an abnormal condition;
 - calling for user's awareness or attention.
- d) Others: Any other lighting mode not included among those above. For example, a mode that uses a gradual increase or decrease of luminance.

4.2 Colour

- a) Colours of indicator lights shall be noticeable from the surroundings.

NOTE 1 Selection of colour for indicator lights relative to surroundings using fundamental colours that can be readily identified (see ISO 24505).

NOTE 2 The surrounding means the vicinity of an indicator light. This applies to other parts using this term in this document.

- b) If changes of multiple colours are employed in one light, or if use of multiple lights of different colours in one product, each colour shall be discriminable from the others.

NOTE A combination of fundamental colours tends to be discriminated easily (ISO 24505).

- c) Colour shall not be the only means of discriminating indicator lights. Other ways, e.g. difference in luminance contrast, shape, physical location, temporal patterns, may also be used.

NOTE 1 People with colour deficiency can have difficulty discriminating colours between red and green.

NOTE 2 People with low vision can need greater colour differences or luminance contrasts to discriminate colours.

NOTE 3 Lights appear differently when the size of them is smaller than 20' of visual angles. See Notes to entry 3.3 and Notes in 4.4.

- d) Colour naming of indicator lights should use colour terms based on fundamental colours (see 3.6).

4.3 Luminance

- a) The indicator light luminance should be set at a level of good visibility at the viewing axis and condition. Factors supporting good visibility include colour, size, luminance of the surroundings, blinking or not blinking, ambient illuminance level of a product, and the visual capability of the user.

In case of white coloured lights with black or white surroundings, steady lights, and in photopic or mesopic conditions, [Table 1](#) or [Table 2](#) should be used to determine the luminance.