
**Dynamic signs in physical
environments —**

**Part 1:
General requirements**

*Signes dynamiques dans les environnements physiques —
Partie 1: Exigences générales*

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Published in Switzerland

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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).

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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 5, *Ergonomics of the physical environment*.

A list of all parts in the ISO 23456 series can be found on the ISO website.

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

Dynamic signs, which provide information with changing spatial and temporal images, are intended to be used for delivering cautions to improve safety in road traffic environments, public buildings, outdoor spaces and factories and for providing prompt and reliable guidance for enhanced convenience in those situations. For static displays, ISO 7010 specifies the adequate size depending on the viewing distance. Currently, most information indicating specific locations and directions within space depends on static signs. The development of dynamic signs is at a practical stage in many countries (see [Annex A](#)).

Though the significance, necessity and feasibility of dynamic signs have been recognized, there are currently no International Standards that describe the ergonomic requirements that should be understood by both device manufacturers and content creators. In order to enable this new technology to spread through the marketplace quickly and adequately, it is important that designs that do not take into account the ergonomic characteristics of the information recipient are avoided. Accordingly, this document describes the ergonomic principles for the application of dynamic signs.

This document describes a common set of general requirements for future developments of individual standards, in which numerical criteria of requirements are set depending on the individual target environment.

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Dynamic signs in physical environments —

Part 1: General requirements

1 Scope

This document describes general ergonomics requirements in relation to dynamic signs, as this responsive information presentation technology changes depending on the environmental conditions in which it is used (e.g. environmental illumination, density of people).

Dynamic signs are presented adaptively to those environmental conditions.

The general requirements for dynamic signs consist of visibility (divided into conspicuity, distinctiveness, legibility and comprehensibility), visual image safety and accessibility. The requirements and recommendations for each are also described.

This document does not cover static signs.

This document does not include requirements for safety signs for the marking of escape routes.

NOTE There are some related recommendations in ISO 30061.

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 3864-1, *Graphical symbols — Safety colours and safety signs — Part 1: Design principles for safety signs and safety markings*

ISO 3864-4, *Graphical symbols — Safety colours and safety signs — Part 4: Colorimetric and photometric properties of safety sign materials*

3 Terms and definitions

For the purposes of this document, the following terms and definitions 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

dynamic sign

sign which changes position, size, colour, brightness and/or content for caution and guidance by flashing, motion or both depending on the environmental conditions

Note 1 to entry: The term “dynamic” has two meanings: 1) the dynamic change increases the human perceptual *visibility* (3.3); 2) the changing content conveys multiple information adaptively.

Note 2 to entry: Possible applications of dynamic signs are shown in [Annex A](#).

Note 3 to entry: Combination of the properties is considered in terms of the *visibility* (3.3).

Note 4 to entry: Here, “caution” is a term defined in ISO 3864-2:2016, 3.1, i.e. “signal word used to indicate a potentially hazardous situation which, if not avoided, could result in minor or moderate injury”.

3.2 static sign

information display whose position, size, duration, visual attribution (e.g. colour, luminance, shape) and meaning do not vary temporally or spatially

3.3 visibility

extent to which a visual display can be seen easily and accurately

3.4 conspicuity

extent to which the sign indicates its presence by attracting the attention visually

3.5 distinctiveness

extent to which the difference between visual signs can be detected

3.6 legibility

extent to which the characters are readable visually

3.7 comprehensibility

extent to which the sign is understandable

3.8 image safety

concept that has as its purpose the protection of vulnerable persons from the undesirable biomedical effects on human health, particularly those caused by moving images presented on electronic displays

3.9 accessibility

extent to which products, systems, services, environments and facilities can be used by people from a population with the widest range of user needs, characteristics and capabilities to achieve identified goals in identified contexts of use

Note 1 to entry: Context of use includes direct use or use supported by assistive technologies.

4 Dynamic signs

This clause describes the elements, ergonomic aspects and necessary design elements to be considered for dynamics signs.

Dynamics signs, which are displayed by video projectors or video displays, shall convey caution, guidance and information using graphic symbols, pictograms, simple fonts and simple sentences.

Signs which are displayed by the head mount type, glasses type or hand-held displays are excluded.

Dynamic signs shall not be used as an exclusive means to convey information related to danger or warnings but shall be used for advance indication of the presence of physical barriers and caution notifications.

Dynamic signs are display systems that enable the use of components that change spatially and/or temporally to enhance the visibility of the object presented and that allow the semantic content to be modified to suit the situation. Dynamic signs have such characteristics as:

- being able to easily attract attention by flashing or moving the image;
- allowing the content and attribution (e.g. colour, shape, size) to be modified adequately;
- enabling the communication of lengthy items by scrolling text;
- maintaining visibility depending on the surrounding environment (e.g. brightness, degree of crowding).

Specific examples of these are shown in [Annex A](#).

Considering these characteristics of dynamic signs, the presentation and design requirements of dynamic sign shall be considered from human ergonomic perspectives relating to the following three aspects: visibility, visual image safety and accessibility. The requirements for visibility can be further categorized into conspicuity, distinctiveness, legibility and comprehensibility, as described in [Table 1](#).

Primal factors of dynamics signs are summarized in [Table 1](#).

Table 1 — Primal factors of dynamic signs

		Ergonomic aspects of dynamic signs	Necessary design elements to be considered
Visibility	1 Conspicuity	The attention can be easily drawn to the dynamic sign.	Flashing, moving and rotating, zooming in and out, fade in, display location of the sign
	2 Distinctiveness	The information presented by the dynamic sign to which attention has been drawn can be easily distinguished and shall not mislead recipients.	Ease with which the icons and characters can be seen and read (e.g. speed with which the icons and characters displayed move, speed with which they flash, direction of movement, number of display repetitions, colour, size, type of font, background and contrast, display location)
	3 Legibility	The character representation presented by the dynamic sign can be easily read.	Ease with which icons and displayed content can be understood, and difficulty of being misread.
	4 Comprehensibility	The text information presented by the dynamic sign can be easily understood.	Ease with which the text information can be displayed with familiar pictograms and in different languages clearly.
5 Visual image safety	The display does not inflict unacceptable harm or unnecessary discomfort on the people it targets, when they look at the dynamic sign display after having their attention drawn to it.	Colours displayed, frequency and period of flickering, contrasts in colour and brightness while flickering, uncomfortable display content, location of display.	
6 Accessibility	The aspects of 1, 2, 3 and 4 shall be satisfactory regardless of age, gender, language, culture, custom, physical ability or level and degree of disability.	Presentations that compensate for reduced physical function. Displays in multiple languages. Verbal expressions and icon displays that are common to multiple cultures and lifestyles. Displays of colour and brightness that have significance common to multiple cultures and lifestyles.	

Dynamic signs can also be divided into two classes:

- i) those with changes to the design pattern (e.g. by animated motion) in information conveyed by the dynamic sign;
- ii) those which switch between different distinct design patterns in a non-continuous manner with multiple static signs.

For signs covered by ii), the description of requirements and recommendations can be determined by time interval.

Sign presented for a long duration and beyond a certain time interval (e.g. one day, one year) can be classified as long-term static signs and are not covered in this document. There are established existing standards on requirements for such long-term static signs.

5 Visibility

5.1 General

The following ergonomic considerations shall be taken into account for the design and presentation of dynamic signs:

- the types of graphical symbols and pictorial symbols to be displayed and their requirements;
- the types of characters to be displayed and their requirements;
- the types of dynamic display methods and their requirements;
- the visual requirements for caution, guidance and information to be displayed;
- the requirements for presenting multiple items of caution, guidance and information simultaneously.

Considering these properties ensures dynamic signs are understood easily, and signs should be placed in easily seen locations. Use of dynamic signs should be avoided in emergency situations to avoid risk to the observer's life due to oversight.

5.2 Graphical symbols and pictorial symbols to be displayed

Graphical symbols and pictorial symbols used in dynamic signs shall be simple and clearly visible considering, for example, moving velocity, frequency of flickering, location of presentation, font size, contrast, complexity of expression and viewing distance. Accessibility (e.g. age) shall be considered.

5.3 Characters to be displayed

5.3.1 Font style

Font style shall be considered to ensure visibility.

NOTE A sans-serif font is more visible than a serif font of the same size (see ISO 24509).

5.3.2 Font size

The size of the characters shall be selected with consideration for the needs of older persons with deteriorating eyesight. It shall be appropriate for the viewing distance assumed. Characters shall be of a size that makes them legible, at the very least when they are static.

NOTE Methods for estimating the minimum legible font size for older persons in a static display are described in ISO 24509.

5.3.3 Presentation content and context

The presentation content shall be concise and easy to understand considering the context of use.

NOTE This prevents the viewer from having to make too much effort to understand the information conveyed by the dynamic sign.

5.3.4 Number of characters

As few characters as possible should be used and changes in their position should be made in a way that does not cause them to be misread.

5.4 Types of dynamic display methods and their requirements

5.4.1 Types of dynamic presentation incorporating movement

Sliding in, sliding out (changes in position in the horizontal or vertical direction), floating in, floating out, splits, wipes and rotations may be used.

5.4.2 Types of temporal variation in brightness, chromaticity or shape

Fading in, fading out (changes in brightness), zooming in and out, flashing and deformation may be used.

5.5 Visual requirements for dynamic signs to be considered

5.5.1 Information volume

In cases where a large volume of information is presented, it should be made easy to understand by focusing on showing priority information to users or by switching information.

5.5.2 Size

The size of graphical symbols shall be appropriate for the viewing distance assumed. It shall be set to a size that makes graphical symbols legible, at the very least when they are static.

NOTE For static signs, see ISO 7010.

5.5.3 Colour

Dynamic signs should use colours that are easy to discern and identify by such means as enlarging the variance in brightness, hue and saturation between the background colour and the colour of the sign. Signs that involve safety considerations shall conform to the safety colours shown in ISO 3864-1 and ISO 3864-4.

5.5.4 Contrast and luminance

In consideration of diverse users, sufficient luminance and luminance contrast should be ensured with regard to the background.

5.5.5 Lead time, presentation time and velocity

When awareness, understanding and response are required, a lead time shall be established. Caution, guidance and information shall be presented before the occurrence of the event to which attention is being drawn.

5.5.6 Display location

Caution, guidance and information shall be presented in a location that does not cause them to be misread or misunderstood. They should be easily visible and legible from the location required. When projecting signs upwards, attention should be given to safety issues.

5.5.7 Discomfort and annoyance from signs

Signs should not cause visual discomfort or annoyance (e.g. glare).

5.5.8 Requirements for combinations of symbols and characters

When presenting graphical or pictorial symbols in combination with characters, consideration should be given to the size of the characters and their alignment in relation to the graphical or pictorial symbols.

6 Visual image safety

6.1 Considerations for avoiding photosensitive seizures

The design of signs shall carefully consider the risk of inducing photosensitive seizures during the presentation of flashing or repetitive patterns.

NOTE Methods to reduce visually induced photosensitive epileptic seizures are described in ISO 9241-391 and ISO/IEC 40500 (W3C).

6.2 Considerations for avoiding visually induced motion sickness

The design of signs shall carefully consider the risk of visually induced motion sickness caused by moving components in images.

NOTE Methods to reduce visually induced motion sickness are described in ISO 9241-394.

6.3 Considerations for avoiding visually induced balance disorder

The design of signs should carefully consider the risk of visually induced balance disorder caused by moving components in images.

6.4 Considerations for restricting misuse

In order to avoid inducing psychological stress or danger as a result of misreading, misuse of dynamic signs should be avoided.

7 Accessibility

7.1 Consideration of diverse users and diverse context of use

The following should be considered in relation to accessibility.

Diversity of users: aging, low vision, cognitive disorder, physical disability.

Visual properties: visual acuity, spatial resolution, luminosity function, motion perception, character cognition, form cognition.

NOTE ISO 24502 specifies the age-related luminance contrast and provides a basic method of calculation that can be applied to the static visual signs. ISO/TR 22411 also provides ergonomics data and knowledge about human abilities – sensory, physical and cognitive – from the viewpoint of accessible design.

The use of complicated figures that increase the strain on cognition and/or mislead recipients is not recommended.

The situation of people with a variety of sensory characteristics should be considered and other means of notification used in combination with dynamic signs (e.g. variations in the state of tactile control panels, vibration, sound, voice, screen messages).

NOTE Requirements for auditory signals are described in ISO 24500 and ISO 24501. Matters for general consideration in relation to diverse users, such as people with low vision, wheelchairs users, children and older persons, are set out in ISO/IEC Guide 71.

7.2 Use of multiple languages

On the assumption that observers have different first languages, textual displays should be created in multiple languages.

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Annex A (informative)

Examples of dynamic sign use

A.1 Use in a public environment

[Figure A.1](#) shows a situation-dependent application of dynamic signs to three elevators. The left door indicates that the elevator is not working; the centre door announces that a wheelchair user is coming out; and the right door indicates that it is a lift going up. [Figure A.2](#) is an example of the application of personalized dynamic signs. As the wheelchair user approaches, he or she is informed of the location of the wheelchair entrance.



Figure A.1 — Example of dynamic sign application in an elevator hall