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Dynamic signs in physical environments —

Part 1: General requirements

Signes dynamiques dans les environnements physiques —

Partie 1: Exigences générales

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Foreword

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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.

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.