

SLOVENSKI STANDARD

SIST EN 842:1998

01-november-1998

J U f b c g h i f c Y j ' ! ' J] X b] ' g] [b U] ' n U b Y j U f b c g h ! ' G d ` c y b Y ' n U h Y j Y ž b U f l c j U b Y '] b
d f Y g _ i y U b Y

Safety of machinery - Visual danger signals - General requirements, design and testing

Sicherheit von Maschinen - Optische Gefahrensignale - Allgemeine Anforderungen,
Gestaltung und Prüfung

Sécurité des machines - Signaux visuels de danger - Exigences générales, conception et
essais

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN 842:1998](https://standards.iteh.ai/catalog/standards/sist/5e56d562-b7e3-4a08-9479-c80e60b3533f/sist-en-842-1998)

Ta slovenski standard je istoveten z:

EN 842:1996

<https://standards.iteh.ai/catalog/standards/sist/5e56d562-b7e3-4a08-9479-c80e60b3533f/sist-en-842-1998>

ICS:

13.110

Varnost strojev

Safety of machinery

SIST EN 842:1998

en

iTeh STANDARD PREVIEW **(standards.iteh.ai)**

SIST EN 842:1998

<https://standards.iteh.ai/catalog/standards/sist/5e56d562-b7e3-4a08-9479-e80e80b3533f/sist-en-842-1998>

EUROPEAN STANDARD

EN 842

NORME EUROPÉENNE

EUROPÄISCHE NORM

June 1996

ICS 13.110

Descriptors: safety of machines, ergonomics, hazard, danger zone, warning system, visual signal, requirement, design, tests

English version

Safety of machinery - Visual danger signals - General requirements, design and testing

Sécurité des machines - Signaux visuels de
danger - Exigences générales, conception et
essais

Sicherheit von Maschinen - Optische
Gefahrensignale - Allgemeine Anforderungen,
Gestaltung und Prüfung

This European Standard was approved by CEN on 1995-11-30. CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

The European Standards exist in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

Contents

	Page
Foreword	3
1 Scope	3
2 Normative references	4
3 Definitions	4
4 Safety and ergonomic requirements	4
4.1 General	4
4.2 Detectibility	5
4.3 Discriminability	7
4.4 Glare	8
4.5 Distance	8
4.6 Duration	8
5 Physical measurements	8
6 Subjective visual check	8
Annex A (informative) Bibliography	9
Annex ZA (informative) Clauses of this European Standard addressing essential requirements or other provisions of EU directives	10

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 842:1998

<https://standards.iteh.ai/catalog/standards/sist/5e56d562-b7e3-4a08-9479-e80e80b3533f/sist-en-842-1998>

Foreword

This European Standard has been prepared by Technical Committee CEN/TC 122 "Ergonomics", the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by December 1996, and conflicting national standards shall be withdrawn at the latest by December 1996.

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative annex ZA, which is an integral part of this standard.

On the international level the International Standard ISO 11428 "Ergonomics - Visual danger signals - General requirements, design and testing" has been prepared by WG 3 "Danger signals and speech communication in noisy environments" of ISO/TC 159/SC 5 "Ergonomics of the physical environment". The technical content of both the European Standard EN 842 and the International Standard ISO 11428 is identical, however the limits of applicability of the standards to other technical fields are different.

Due to the different limits of applicability still existing on the European and international level direct transformation of the International Standard into a European Standard is not possible. The reason is that EN 842 has been prepared in order to fulfil the essential safety and health requirements of annex I of the Council Directive 89/392/EEC of 14 June 1989 on the approximation of the laws of the Member States relating to machinery: Essential health and safety requirements relating to the design and construction of machinery (see annex A of EN 292-2:1991/A1: 1995) and that therefore the limits of applicability of the European Standard is restricted to this Directive.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This European Standard describes criteria for the perception of visual danger signals in the area that people are intended to perceive and to react to such a signal. It specifies the safety and ergonomic requirements and the corresponding physical measurements and subjective visual check. It also provides guidance for the design of the signals to be clearly perceived and differentiated as described in 5.3 of EN 292-2 : 1991.

This European Standard does not apply to danger indicators:

- presented in either written or pictorial form;
- transmitted by data display units.

This European Standard does not apply to special regulations such as those for public disaster and public transport.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 292-2 : 1991/A1 : 1995	Safety of machinery – Basic concepts, general principles for design – Part 2: Technical principles and specifications
EN 60073	Coding of indicating devices and actuators by colours and supplementary means (IEC 73:1991)
EN 61310-1	Safety of machinery – Indication, marking and actuation – Part 1: Requirements for visual, auditory and tactile signals (IEC 1310-1 : 1995)
ISO 3864	Safety colours and safety signs

3 Definitions

For the purposes of this standard the following definitions apply:

3.1 visual danger signal: Visual signal indicating imminent onset, or actual occurrence of a dangerous situation, involving risk of personal injury or equipment disaster, and requiring some human response to eliminate or control the danger or requiring other immediate action.

A distinction is made between two types of visual danger signals: visual warning signal and visual emergency signal.

3.1.1 visual warning signal: Visual signal indicating the imminent onset of a dangerous situation requiring appropriate measures for the elimination or control of the danger.

3.1.2 visual emergency signal: Visual signal indicating the beginning or the actual occurrence of a dangerous situation requiring immediate action.

3.2 signal reception area: Area in which the signal is intended to be perceived and reacted upon.

3.3 field of vision (visual field): Physical space visible to an eye in a given position (see also 3.1.10 of ISO 8995 : 1989).

3.4 danger signal light: Light source intended to convey information about the existence of a dangerous situation by means of one or several characteristics, such as luminance¹⁾, colour, shape, location and temporal pattern.

4 Safety and ergonomic requirements

4.1 General

The characteristics of the visual danger signal shall ensure that any person in the signal reception area can detect, discriminate and react to the signal as intended. Visual danger signals shall be:

- clearly seen under all possible lighting conditions;
- clearly discriminated from general lighting and other visual signals;
- allocated a specific meaning within the signal reception area.

Visual danger signals shall take precedence over all other visual signals.

Visual emergency signals shall take precedence over all visual warning signals.

Care shall be taken to review the effectiveness of the visual danger signals at regular intervals and whenever a new signal (whether a danger signal or not) is introduced in the signal reception area.

NOTE 1: A visual danger signal should, if not contradicted by special reasons, be associated with an auditory danger signal. When the danger signal is an emergency signal, auditory and visual signals should be presented together (see EN 981).

¹⁾ As defined in ISO 8995

NOTE 2: It could be advantageous for visual danger signals to have a relatively low intensity test mode to indicate they are functional but not in a warning mode.

4.2 Detectability

4.2.1 Luminance¹⁾, illuminance¹⁾ and contrast¹⁾

4.2.1.1 General

Two types of light sources need to be distinguished: luminous area sources and luminous point sources²⁾. Luminous area sources have a visual angle greater than 1' (minute) for daylight conditions or 10' (minutes) for darkness; otherwise the light sources are luminous point sources.

4.2.1.2 Luminous area sources

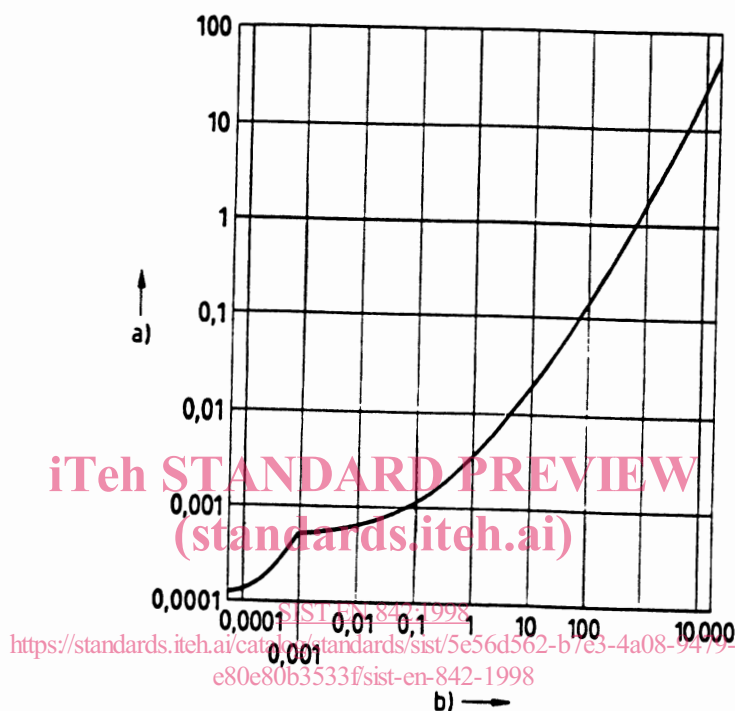
In all cases when the light source is not to be regarded as small (point source), the criteria for detectability characters are the luminance of the surface, the luminance of the background and their ratio. This luminance ratio (contrast) is not affected by viewing distance (unless transmissivity is to be taken into account, see 4.5) so a specified luminance ratio can be considered adequate for a wide range of viewing conditions.

The luminance of a visual warning signal shall be at least five times the luminance of the background. The luminance of a visual emergency signal shall be at least twice that of a warning signal, i.e. at least ten times the luminance of the background.

4.2.1.3 Luminous point sources

For luminous point sources, the criterion for detectability is the illuminance produced by the luminous flux on the pupil of the observer's eye compared to the luminance of the background.

The relationship between the pupillary illuminance required for detectability and the background luminance is given in figure 1.



a) Required pupillary illuminance in Lux

b) Background luminance in cd/m²

Figure 1: Relationship between the required pupillary illuminance and the background luminance

¹⁾ As defined in ISO 8995

²⁾ As defined in IEC 50(845)

4.2.2 Flashing lights

Flashing lights shall be used for visual emergency signals.

By having a signal flash, i.e. continuously switching ON and OFF, the detectability (attention-attracting qualities) of the signal is usually increased, often accompanied by transmission of a feeling of urgency.

NOTE 1: It is recommended that the flash frequency should be between 2 Hz and 3 Hz with approximately equal ON- and OFF-intervals.

NOTE 2: Synchronism between light and sound is not generally required, but can improve perception.

NOTE 3: Stroboscopic effects from, e.g., rotating machinery, can reduce the detectability of flashing light signals.

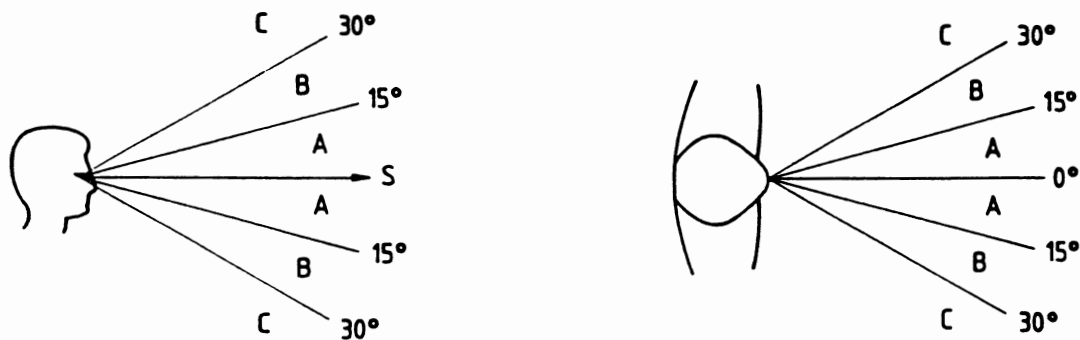
4.2.3 Location within the field of vision

Visual danger signals should be located where appropriate in the direct vicinity of the potential danger in order to allow its immediate detection by all persons within the signal reception area, or about to enter in this area. Additional visual danger signals located outside the direct vicinity, such as in a control room or a control panel, are not excluded.

The signal reception area of a visual danger signal shall be explicitly stated in the design for every installation, indicating whether the signal reception area is, e.g., just a single operator's console or parts of a factory or a whole plant.

For directly displayed danger signals, the signal lights shall be located within the field of vision inside the workplace being considered (signal reception area) (see figures 2 and 3 and prEN 894-2).

When the direction of the eye changes as a result of the work activity, or when the fields of vision of several people are non-overlapping, additional signal lights shall be installed. The signalling devices shall be positioned so that at least one danger signal is visible from any point within the signal reception area.



a) Vertical field of vision

b) Horizontal field of vision

Zone A: Recommended

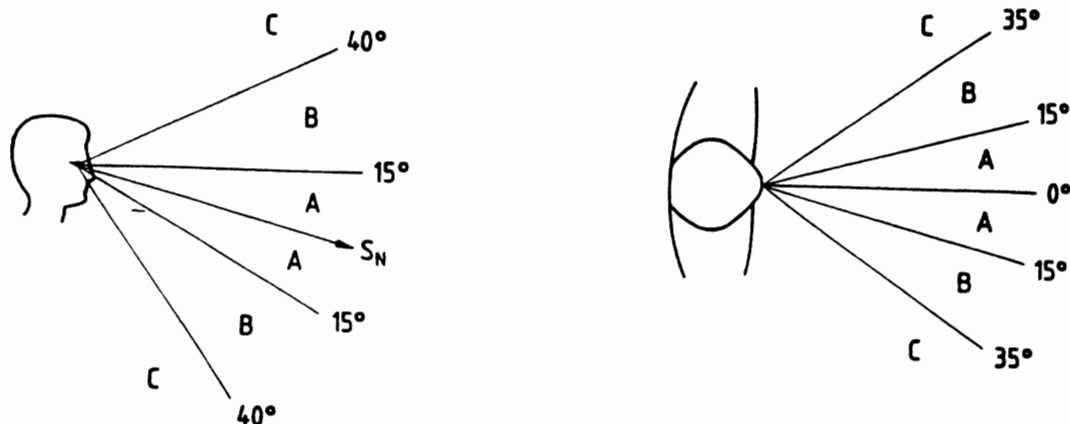
Zone B: Acceptable

Zone C: Not suitable

Line S: Imposed line of sight

<https://standards.iteh.ai/catalog/standards/sist/5e56d562-b7e3-4a08-9479-e80e80b3533e/sist-en-842-1998>

Figure 2: Field of vision when line of sight direction is imposed by external task requirements



a) Vertical field of vision

b) Horizontal field of vision

Zone A: Recommended

Zone B: Acceptable

Zone C: Not suitable

Line S_N : Normal line of sight, 15° to 30° below the horizontal

Figure 3: Field of vision when line of sight direction is not imposed by external task requirements

4.3 Discriminability

4.3.1 General

When a visual danger signal has been detected it is of vital importance that the correct measures are taken; therefore the signal information needs to be transmitted unambiguously.

Discrimination between visual danger signals shall be accomplished using at least two means of the following characteristics.

4.3.2 Colour of signal light

A visual warning signal shall be yellow or yellow-orange.

A visual emergency signal shall be red.

If visual warning and visual emergency signals are used both in a working area, and if despite the difference in colour the signals can not be clearly discriminated, the emergency signal shall have at least twice the intensity of that of the warning signal.

Colours of signal lights and their meaning shall be in accordance with EN 60073, EN 61310-1 and ISO 3864.

NOTE: For the choice of colours in a system of auditory and visual danger and information signals see EN 981.

4.3.3 Location

Whenever possible the visual danger signal should be placed so as to facilitate immediate and correct understanding of the nature of the danger and of the immediate measures to be taken.

4.3.4 Relative position of lights

If two or more signal lights are used in a signalling device the red signal shall always be positioned above the yellow one. If two red lights are used, they shall be horizontally aligned.

4.3.5 Temporal pattern

Flashing lights shall be used for visual emergency signals. It is preferable to use more than one light in the same signalling device, to allow both a spatial and a temporal pattern of flashing.