SLOVENSKI STANDARD
SIST EN 981:1998+A1:2008

01-december-2008

Varnost strojev - Sistem slišnih in vidnih nevarnostnih ali obvestilnih signalov

Safety of machinery - System of auditory and visual danger and information signals

Sicherheit von Maschinen - System akustischer und optischer Gefahrensignale und Informationssignale

Sécurité des machines - Système de signaux auditifs et visuels de danger et d'information

Ta slovenski standard je istoveten z: **EN 981:1996+A1:2008**

ICS:

13.110	Varnost strojev	Safety of machinery

SIST EN 981:1998+A1:2008 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 981:1996+A1

September 2008

ICS 13.110

Supersedes EN 981:1996

English Version

Safety of machinery - System of auditory and visual danger and information signals

Sécurité des machines - Système de signaux auditifs et visuels de danger et d'information

Sicherheit von Maschinen - System akustischer und optischer Gefahrensignale und Informationssignale

This European Standard was approved by CEN on 21 October 1996 and includes Amendment 1 approved by CEN on 14 August 2008.

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 CEN Management Centre or to any CEN member.

This European Standard exists 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 CEN Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: rue de Stassart, 36 B-1050 Brussels

Ref. No. EN 981:1996+A1:2008: E

Contents

Page

Foreword

This document (EN 981:1996+A1:2008) 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 March 2009, and conflicting national standards shall be withdrawn at the latest by December 2009.

This document includes Amendment 1, approved by CEN on 2008-08-14.

This document supersedes EN 981:1996.

The start and finish of text introduced or altered by amendment is indicated in the text by tags ⟨A1⟩ ⟨A1⟩.

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).

⟨A1⟩ For relationship with EU Directive(s), see informative Annexes ZA and ZB, which are integral parts of this document. ⟨A1⟩

On the international level the International Standard ISO 11429 "Ergonomics – System of auditory and visual danger and information signals" 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 ⟨A1⟩ EN 981 ⟨A1⟩ and the International Standard ISO 11429 is identical, with the exception of the emergency evacuation signal which is not dealt with in this European standard, 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 981 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, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

1 Scope

To reduce risks associated with misinterpretation of visual and auditory danger signals, a system of danger and information signals is specified taking into account the different degrees of urgency.

This European Standard is applicable to all danger and information signals which have to be clearly perceived and differentiated as specified in 5.3 of EN 292-2:1991, by other requirements or by the work situation, and to all degrees of urgency – from extreme urgency to an ALL CLEAR situation. Where visual signals are to be complementary to sound signals, the signal character is specified for both.

This European Standard does not apply to certain fields covered by specific standards or other conventions in force (international or national); in particular, fire alarms, medical alarms, alarms used in the field of public transport, navigation signals and signals for special fields of activity (for example, military). When new signals are being planned, however, this European Standard should be considered in order to avoid inconsistency.

For auditory signals, the system of signal character is a guideline for a signal language based on message categories which are classified according to urgency. Certain characters are specified for purposes which require safe and rapid recognition. Certain categories allow possibilities for variants, e.g. control and warning signals at workplaces where the signalling is intended for personnel with specific training.

For visual signals, the established meanings of the safety colours are not affected by this European Standard. For different needs, complementary meanings have been assigned to the signals by timed patterns, and in a very few cases by alternating colours.

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 457:1992, *Safety of machinery – Auditory danger signals – General requirements, design and testing (ISO 7731:1986 modified).*

EN 842:1996, *Safety of machinery – Visual danger signals – General requirements, design and testing*.

EN 60073, *Coding of indicating devices and actuators by colours and supplementary means (IEC 73:1991).*

ISO 8995, *Principles of visual ergonomics – The lighting of indoor work systems*.

ISO 9921-1, *Ergonomic assessment of speech communication – Part 1: Speech interference level and communication distances for persons with normal hearing capacity in direct communication (SIL method)*.

3 Definitions

For the purposes of this standard the following definitions apply:

3.1
alternating sound [light]
shifts between two or three acoustical [optical] spectra, with equal duration of the segments, at least 0,15 s each

3.2
bursts of sound
normally recurrent group of sound pulses with short but distinct interruptions, the pulse period, including interruption, being between 0,25 s and 0,125 s

3.3
character of a signal
combination of one or more auditory or visual components differentiating one signal from another

3.4
flash
light of duration less than 0,5 s.

3.5
quick-pulse
sound of duration less than 0,5 s.

3.6
segment
one of a number of parts in a sound or light signal during which the signal character is constant

3.7
spectrum of sound [light]
intensity or sound pressure level of sound [light] represented as function of frequency or wavelength

3.8
sweeping [sound]
continuously or discretely varying frequency

4 Ergonomic principles for the design and application of auditory and visual signals

4.1 General

4.1.1 Auditory and visual signals shall be rapidly recognizable under all environmental conditions anticipated for their use. The recognition of a signal depends on many physical and psychophysical characteristics.

To ensure that signal effectiveness is not compromised by lack of reliability of signals, false alarm should be minimized or eliminated.

Signals shall be effective under all conditions of use, including conditions of environmental disturbance of the recognition process and in situations involving the highest degree of importance and urgency for action. Signal intensity shall be in accordance with EN 457 and EN 842.

4.1.2 The risk of panic caused by signalling is to be considered, but should not be overestimated. In principle, two steps of panic reaction can be apparent:

The first sound impulse or flash of light can generate unintended fright. To avoid this shock-effect, the initial intensity of the sound should not be too high but should increase during the duration of the signal.

The sudden question: "What is happening?" can generate feelings of uncertainty and panic. Therefore, regular information is most essential.

4.2 Principles for distinctive characters

The primary requirement for a signal is some kind of typical pattern, which makes the signal message unambiguous and ensures recognition under different difficult environmental conditions. The necessary variations can be produced in several ways, but are basically achieved by variation in intensity or in spectrum of light or sound.

Although there is an analogy between the spectrum of light and sound, there are limitations to how this analogy can be used to make auditory and visual signals similar. For example, it is not wise to try to use sweeping colour like the sweeping pitch of sounds. For light, five colours are used which each carry the same meaning, while for sound five analogous constant pitches are not used because pitch is a major tool which makes the signal audible with respect to the acoustical environment. In practice, any physical similarity

between sound and light signals shall be based on temporal variation (i.e. variation in intensity over time) like characters from e.g. Morse Code.

Most people have the ability to remember and identify only very few different time patterns of signals. Echoes and acoustical delay can change the perceived character of a signal, especially when separate sound sources are used.

4.3 Qualities of auditory signals

The design of auditory signals shall be in accordance with EN 457. The use of speech signals shall be in accordance with ISO 9921-1.

A priority classification of auditory signal character according to importance or urgency has been applied (see table 1). Signals with frequency variation – sweeping or alternating – are reserved for the most dangerous situations. Signals with constant frequency segments can be short grouped pulses (bursts), or sequences of equal or unequal segments. More than two different lengths of sound in each sequence shall not be used. The ratio of lengths should not be less than 1:3. Higher pitch is associated with greater urgency, but particular frequency distributions are not specified.

Variants in character (maintaining specified features) are available for numerous specific purposes within the two message categories DANGER and CAUTION. By applying the main scheme (see table 1) which specifies significant but not detailed character, a number of variants will be available.

4.4 Qualities of visual signals

The design of visual signals shall be in accordance with EN 842 and ISO 8995.

Certain special light sources for extremely short but high intensity flashes play an important role for warning, but the requirements of 4.2.2 of EN 842:1996 shall be met.

NOTE Reduction in the duration of a light also reduces its brightness. This effect applies also to sound pulses lasting less than approximately 0.2 s. However, short flashes and sound pulses are often preferred for technical reasons.

5 System of auditory and visual signals

5.1 Scheme of purposes and character

The principal requirements for the system of signals are summarized in tables 1 and 2. More detailed design parameters and remarks are listed in table 3 for sound coding and in table 4 for colour coding. According to the degree of urgency, the message category as well as the appropriate signal character shall be chosen from table 1.

In case of public alarm, table 2 shall be applied.

5.2 Scheme of auditory signal character

Additional character of auditory signals are given in table 3.

5.3 Scheme of visual signal colours

Additional character for visual signals are given in table 4.

6 Testing

Regular routine tests according to clause 6 of EN 457:1992 and clause 6 of EN 842:1996 shall be carried out, including testing for detection of character and understanding of their meaning.