

# SVENSK STANDARD

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**Ergonomi – Varningssignaler för offentlig miljö och arbetsplatser – Auditiva varningssignaler (ISO 7731:2003)**

**Ergonomics – Danger signals for public and work areas – Auditory danger signals (ISO 7731:2003)**



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Denna standard ersätter SS-EN ISO 7731:2005, utgåva 1.

The European Standard EN ISO 7731:2008 has the status of a Swedish Standard. This document contains the official English version of EN ISO 7731:2008.

This standard supersedes the Swedish Standard SS-EN ISO 7731:2005, edition 1.

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN ISO 7731**

September 2008

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Supersedes EN ISO 7731:2005

English Version

## Ergonomics - Danger signals for public and work areas - Auditory danger signals (ISO 7731:2003)

Ergonomie - Signaux de danger pour lieux publics et lieux  
de travail - Signaux de danger auditifs (ISO 7731:2003)

This European Standard was approved by CEN on 25 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.

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## Foreword

The text of ISO 7731:2003 has been prepared by Technical Committee ISO/TC 159 "Ergonomics" of the International Organization for Standardization (ISO) and has been taken over as EN ISO 7731:2008 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of an identical text or by endorsement, at the latest by March 2009, and conflicting national standards shall be withdrawn at the latest by December 2009.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN ISO 7731:2005.

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

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

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 the United Kingdom.

### Endorsement notice

The text of ISO 7731:2003 has been approved by CEN as a EN ISO 7731:2008 without any modification.

## Introduction

This International Standard specifies criteria applicable to the recognition of auditory danger signals, especially in cases where there is a high level of ambient noise. It covers auditory danger signals, designated in the text of this standard by the use of the phrase “danger signals”, which apply to emergency signals and warning signals (see Table 1).

Auditory danger signals can also be found in the following International Standards:

- ISO 8201 dealing with emergency evacuation signals;
- ISO 11429 dealing with auditory and visual danger signals.

Various types of danger signals and their responses are described in Table 1.

It should be noted that ISO 11429 covers this subject in greater detail.

**Table 1 — Various types of danger signals**

Type of danger signal	Response
Auditory emergency evacuation signal	Leave the danger zone immediately
Auditory emergency signal	Take urgent action for rescue or protection
Auditory warning signal	Take preventative or preparatory action

Correctly designed signals can reliably call attention to a hazard or a dangerous situation, even when hearing protection is worn, without causing fright.



# Ergonomics — Danger signals for public and work areas — Auditory danger signals

## 1 Scope

This International Standard specifies the physical principles of design, ergonomic requirements and the corresponding test methods for danger signals for public and work areas in the signal reception area and gives guidelines for the design of the signals. It may also be applied to other appropriate situations.

The relevance given in the definitions as to the difference between an auditory emergency signal, auditory emergency evacuation signal and an auditory warning signal should be noted. The emergency evacuation signal is covered in ISO 8201.

This International Standard does not apply to verbal danger warnings (e.g. shouts, loudspeaker announcements). ISO 9921 covers verbal danger signals.

Special regulations such as those for a public disaster and public transport are not affected by this International Standard.

## 2 Normative references

The following referenced documents are indispensable for the application 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.

IEC 61260, *Electroacoustics — Octave-band and fractional-octave-band filters*

## 3 Terms, definitions and symbols

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

NOTE Definitions of symbols referred to in this International Standard are given in Annex A.

### 3.1

#### **ambient noise**

all sounds in the signal reception area not produced by the danger-signal transmitter

### 3.2

#### **danger signals**

depending on the degree of urgency and the possible effect of the danger on people, a distinction is made between three types of auditory danger signals: an auditory emergency signal, an auditory emergency evacuation signal and an auditory warning signal

#### 3.2.1

##### **auditory emergency signal**

signal marking the onset and, if necessary, the duration and the end of a dangerous situation

**SS-EN ISO 7731:2008 (E)****3.2.2****auditory emergency evacuation signal**

signal indicating the beginning or the actual occurrence of an emergency involving the possibility of injury and instructing the person(s) to immediately leave the danger zone in the recognized manner

NOTE The auditory emergency evacuation signal is the subject of ISO 8201.

**3.2.3****auditory warning signal**

signal indicating the possibility or actual occurrence of a dangerous situation requiring appropriate measures for the elimination or control of the danger

NOTE The auditory warning signal may also provide information concerning the conduct and courses of action to be taken.

**3.3****effective masked threshold**

level of auditory danger signal just audible over the ambient noise, taking account of the acoustic parameters of both the ambient noise in the signal reception area and the listening deficiencies (hearing protection, hearing loss and other masking effects)

**3.4****octave**

bandwidth of a filter which comprises a frequency range of a factor of two

NOTE That is to say, the cut-off frequency  $f_2$  is twice the lower  $f_1$  as specified in IEC 61260; e.g. for an octave-band centred on 500 Hz, the lower frequency is 353 Hz ( $500/\sqrt{2}$ ), the upper frequency is 707 Hz ( $500\sqrt{2}$ ).

**3.5****1/3 octave****fractional-octave-band filter**

bandwidth of a filter which comprises a frequency range of a factor of  $\sqrt[3]{2}$

NOTE 1 That is to say, the cut-off frequency  $f_2$  is  $\sqrt[3]{2}$  times the lower  $f_1$  (i.e.  $f_2 = \sqrt[3]{2} f_1$  as specified in IEC 61260).

NOTE 2 A bandpass filter has a narrower frequency range than an octave filter. The octave filter can be subdivided into three 1/3 octave-bands.

**3.6****reverberation time**

time interval required for the sound-pressure level to decrease by 60 dB, after the emission by the source is stopped

**3.7****signal reception area**

area in which persons are intended to recognize and react to a signal

NOTE This International Standard does not deal with problems that might occur if the danger signals are heard from outside the signal reception area.

**3.8****spectral content**

overall frequency content of a signal, or of the ambient noise

## 4 Safety requirements

### 4.1 General

The nature of the danger signal shall be such that people in the reception area can hear and react to the signal as intended. If persons with hearing impairment (deafness) or hearing protection (helmets, ear plugs, etc.) are likely to be present, special care should be taken. The characteristics of the audible signal shall be adapted to take account of the characteristics relevant to the situation.

### 4.2 Recognition

#### 4.2.1 Introduction

The reliable recognition of a danger signal requires that the signal be clearly audible, be sufficiently different from other sounds in the environment and have an unambiguous meaning.

In order of priority, any emergency evacuation signal shall take precedence over all other danger signals and danger signals shall take precedence over all other auditory signals.

#### 4.2.2 Audibility

**4.2.2.1** The danger signal shall be clearly audible. The effective masked threshold shall be distinctly exceeded. If relevant, the probability of hearing loss in the recipient population may be assessed and taken into account. If hearing protectors are worn, their levels of attenuation shall be known and introduced into the assessment.

To ensure its audibility, the A-weighted sound-pressure level of the danger signal shall not be lower than 65 dB at any position in the signal reception area.

In addition, at least one of the criteria in 4.2.2.2 to 4.2.2.4 shall be met.

**4.2.2.2** For measurements of the A-weighted sound-pressure level [method a) in 5.2.2.1], the difference between the two A-weighted sound-pressure levels of the signal and the ambient noise shall be greater than 15 dB ( $L_{S,A} - L_{N,A} > 15$  dB).

**4.2.2.3** For measurements of the octave-band sound-pressure level [method b) in 5.2.3.1], the sound-pressure level of the signal in one or more octave-bands shall exceed the effective masked threshold by at least 10 dB in the octave-band under consideration ( $L_{Si, \text{oct}} - L_{Ti, \text{oct}} > 10$  dB).

**4.2.2.4** For measurements of the 1/3 octave-band sound-pressure level [method c) in 5.2.3.2], the sound-pressure level of the signal in one or more 1/3 octave-bands shall exceed the effective masked threshold by 13 dB in the 1/3 octave-band under consideration ( $L_{Si, 1/3\text{oct}} - L_{Ti, 1/3\text{oct}} > 13$  dB).

#### 4.2.3 Distinctiveness

Parameters of the danger signal (signal level, frequency spectrum, temporal pattern, etc.) shall be designed to stand out from all other sounds in the reception area and shall be distinctly different from any other signals. (See Clause 6.)

#### 4.2.4 Unambiguity

The meaning of the danger signal shall be unambiguous.

#### 4.2.5 Moving sources

The characteristics of a danger signal from a moving signal source shall be recognizable, regardless of the speed or movement direction of the source.