INTERNATIONAL STANDARD

ISO 23600

First edition
2007-11-01

Assistive products for persons with vision impairments and persons with vision and hearing impairments — Acoustic and tactile signals for pedestrian traffic lights

Aides fonctionnelles pour personnes ayant des déficiences visuelles et/ou des déficiences visuelles et auditives — Signaux acoustiques et tactiles pour feux de circulation

Reference number
ISO 23600:2007(E)

PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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

ISO 23600 was prepared by Technical Committee ISO/TC 173, *Assistive products for persons with disability*.

Introduction

The aim of this International Standard is to specify the requirements for acoustic and tactile signals for pedestrian traffic lights, for persons with vision impairments and persons with vision and hearing impairments.

Persons with vision impairments and persons with vision and hearing impairments travelling alone use a number of techniques and cues in the environment to commence a safe street crossing. Environmental sounds and cues provide timing and directional information.

At an intersection that is equipped with pedestrian lights, acoustic and tactile signals provide equivalent information to persons with vision impairments and persons with vision and hearing impairments.

At an intersection that is not equipped with acoustic and tactile signals, persons with vision impairments are forced to use the sounds of vehicular traffic in order to estimate the time to start crossing a street and to determine their direction of travel. However, the sounds of vehicular traffic are not always available and often insufficient. In the case of persons with vision and hearing impairments, the majority of these people have to rely on assistance. The installation of acoustic and tactile signals for pedestrian traffic lights significantly improves the ability of persons with vision impairments and persons with vision and hearing impairments to travel safely and independently.

Acoustic and tactile signals for pedestrian traffic lights provide persons with vision impairments and persons with vision and hearing impairments with information to know precisely when the walk initiation signal has been activated. They can also provide directional information and the geometry of the intersection.

The specifications and installation methods of acoustic and tactile signals for pedestrian traffic lights have been different from country to country. This International Standard sets out the requirements, technical specifications and performance criteria for acoustic and tactile signals for pedestrian traffic lights.

Assistive products for persons with vision impairments and persons with vision and hearing impairments — Acoustic and tactile signals for pedestrian traffic lights

1 Scope

This International Standard specifies requirements for acoustic and tactile signals for pedestrian traffic lights to assist in safe and independent mobility of persons with vision impairments and persons with vision and hearing impairments.

It is applicable to design, installation and operation of acoustic and tactile signals for pedestrian traffic lights.

It is not applicable to electromagnetic compatibility (EMC), electrical safety or operating conditions.

NOTE Operating conditions can be affected by climate, shock, vibrations or other environmental factors.

2 Terms and definitions

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

2.1
persons with vision impairments
persons who are blind or who have low vision

2.2
persons with vision and hearing impairments
persons who are blind or who have low vision in combination with deafness or hearing loss

2.3
acoustic orientation signal
sound used to enable persons with vision impairments to recognise the presence of and to locate a push-button box and/or pedestrian crosswalk

2.4
walk initiation period
period when the display indicates that pedestrians may begin their crossing in the pedestrian crosswalk

2.5
prohibited walk initiation period
period when the display indicates that pedestrians may not enter the pedestrian crosswalk

NOTE The prohibited walk initiation period consists of two parts: the period following the walk initiation period when pedestrians in the pedestrian crosswalk may continue going out of the pedestrian crosswalk and the period when pedestrians are prohibited to enter the pedestrian crosswalk.

2.6
acoustic walk initiation signal
sound used to indicate to persons with vision impairments the walk initiation period

2.7
tactile walk initiation signal
vibrating or rotating device to indicate the walk initiation period to persons with vision impairments and persons with vision and hearing impairments

3 General

3.1 Acoustic signals

An acoustic signal for persons with vision impairments and persons with vision and hearing impairments can indicate:

a) the presence and location of a push button;

b) the location of a pedestrian crosswalk;

c) the walk initiation period;

d) the direction of the pedestrian crosswalk;

e) the prohibited walk initiation period.

3.2 Tactile signals

Tactile signals for persons with vision impairments and persons with vision and hearing impairments can indicate the walk initiation period and the direction of the pedestrian crosswalk.

3.3 Activation of acoustic and tactile signals

Acoustic and tactile signals can be automatically controlled or activated by a push button or a remote control device carried by an individual.

When acoustic and tactile signals are activated by a push button, activation should be indicated by tactile and/or acoustic feedback.

It is important that the tactile and acoustic feedback to button activation be distinctly different from tactile and acoustic walk initiation signals.

3.4 Additional features

Tactile and/or acoustic features can provide:

a) the characteristics of a pedestrian crosswalk;

b) the shape of an intersection;

c) the name of the intersection;

d) the name of the street to be crossed.

4 Requirements

4.1 General

Acoustic and tactile signals should be used in combination to meet the needs of persons with vision impairments and persons with vision and hearing impairments.

4.2 Acoustic orientation signal

4.2.1 Uses of acoustic orientation signal

An acoustic orientation signal is used to indicate the location of a pedestrian crosswalk, and the presence and location of a push button. The acoustic orientation signal may also be used to indicate the prohibited walk initiation period.

4.2.2 Repetition rate

The repetition rate of the acoustic orientation signal should be 1,0 Hz. The repetition rate shall be between 0,5 Hz and 1,2 Hz. If the acoustic orientation signal and acoustic walk initiation signal consist of the same sounds, the ratio between the repetition rate of the orientation signal shall be equal to or less than 0,2 times the repetition rate of the walk initiation signal.

4.2.3 Audible distance

The acoustic orientation signal should be audible at minimum of 1 m and maximum of 5 m from the sound source, unless an adjacent building is closer.

4.2.4 Sound-pressure level

The sound-pressure level of the acoustic orientation signal should be between 30 dB and 90 dB. The sound-pressure level of the acoustic orientation signal should be 5 dB above ambient noise level. The sound-pressure level of the acoustic orientation signal should not exceed 10 dB above ambient noise level.

4.3 Acoustic walk initiation signal

4.3.1 Common requirements for acoustic walk initiation signal

4.3.1.1 Duration

The acoustic walk initiation signal should remain actuated during the entire walk initiation period.

4.3.1.2 Non-ambiguous acoustic signal

An acoustic walk initiation signal shall give non-ambiguous information regarding the pedestrian crosswalk to which it applies. This can be achieved by one or more of the following:

a) placement of the acoustic and tactile signal within the width of the pedestrian crosswalk;

b) careful control of volume of acoustic signal;

c) use of a tactile signal;

d) speech message.

4.3.1.3 Frequency range

4.3.1.3.1 Multiple frequency sound

The acoustic walk initiation signal should be composed of multiple frequencies. The multiple frequency sound should include both high and low frequencies. The principal frequencies shall be between 300 Hz and 3 500 Hz.

NOTE 1 Sounds having multiple peaks between 500 Hz and 2 500 Hz are useful for detection and localization.

NOTE 2 Sounds having a central frequency above 2 500 Hz can be difficult to detect for persons with an age-related hearing loss.

NOTE 3 In order for persons with age-related hearing loss to detect multiple frequency signals, it is necessary to have sufficient energy in the band between 300 Hz and 1 500 Hz.

4.3.1.3.2 Single frequency sound

The frequency of a single frequency sound should be between 800 Hz and 2 000 Hz.

4.3.2 Requirements for singly- and simultaneously-generated acoustic walk initiation signals

4.3.2.1 Repetition rate

The repetition rate of the intermittent sound of the acoustic walk initiation signal shall be greater than 2,5 Hz. When sounds other than tones are used, the repetition rate for the system shall be more than 0,6 Hz.

EXAMPLE Speech or bird sounds are examples of sounds that are not tones.

4.3.2.2 Audible distance

The acoustic walk initiation signal should be audible at a minimum of 1 m from the sound source. If the acoustic walk initiation signal is used to indicate the direction of the pedestrian crosswalk, the sound of each sound emitter should be detectable for a minimum of two-thirds the length of the pedestrian crosswalk.

4.3.2.3 Sound-pressure level

The sound-pressure level of acoustic walk initiation signals should be automatically adjusted according to ambient sound-pressure level. The sound-pressure level of the acoustic walk initiation signal should be between 30 dB and 90 dB. The sound-pressure level of acoustic walk initiation signal should be 5 dB above ambient noise level. The acoustic walk initiation signal should not exceed 10 dB above ambient noise level.

4.3.2.4 Height of installation

When the sound emitter is installed in or near the visual pedestrian signal, it should be installed 2,0 m to 3,5 m above the ground. The sound emitter may also be included in the push-button box.

4.3.3 Requirements for alternately generated acoustic walk initiation signals

4.3.3.1 General

Alternately generated acoustic walk initiation signals have sound emitters at each end of a pedestrian crosswalk, which emit acoustic walk initiation signals back-and-forth, to assist users in determining a walking direction from the beginning to the end of the pedestrian crosswalk.

4.3.3.2 Repetition rate

The maximum repetition rate of sounds emitted by the sound emitters at each end of a pedestrian crosswalk shall be 1 Hz. The minimum silent period between sounds shall be 0,2 sec (see Figure 1).

4.3.3.3 Audible range

The sound of the acoustic walk initiation signal should be detectable from the entry of a pedestrian crosswalk to the exit (see Figures 2 and 3). For a long pedestrian crosswalk at which it is difficult to detect this sound on the

opposite side, sound of the acoustic walk initiation signal should be relayed at a median island, enabling persons to hear the sounds from all locations of the pedestrian crosswalk and enabling pedestrians to cross in two stages to promote safety.

4.3.3.4 Sound-pressure level

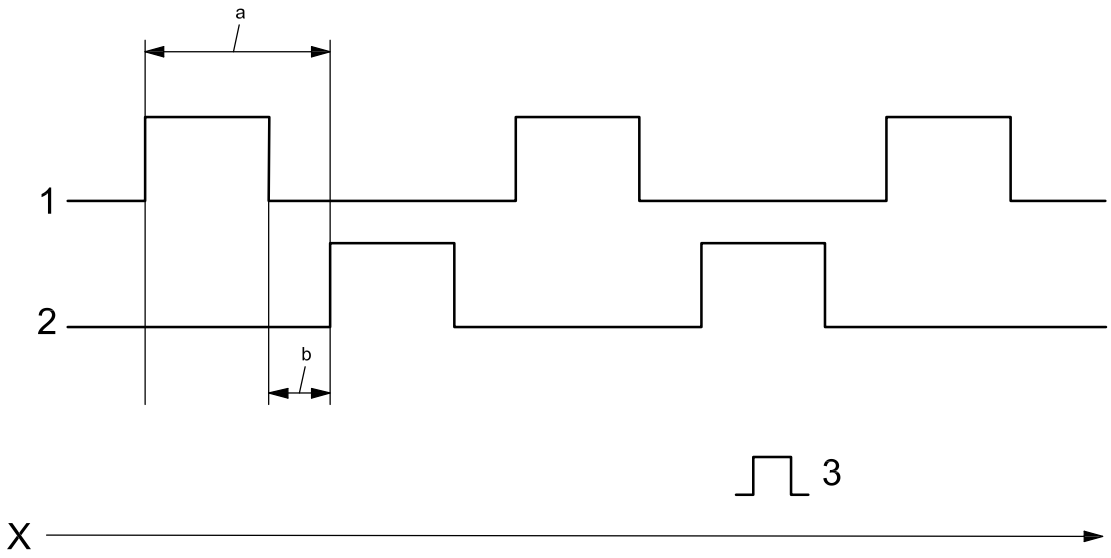
The sound-pressure level of the alternately generated acoustic walk initiation signal should be between 45 dB and 100 dB.

4.3.3.5 Height of installation

Sound emitters should be installed 2,0 m to 3,5 m above the ground.

4.3.3.6 Sound emitter location

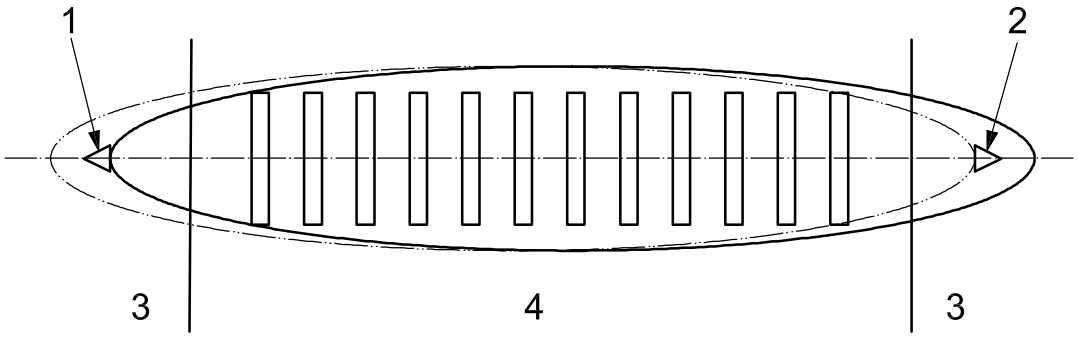
Sound emitters should be installed at the centre of the pedestrian crosswalk width so as to facilitate guidance.



Key

X time
1 sound emitter A
2 sound emitter A'
3 signal sound
[a] 1,0 s min.
[b] 0,2 s min.

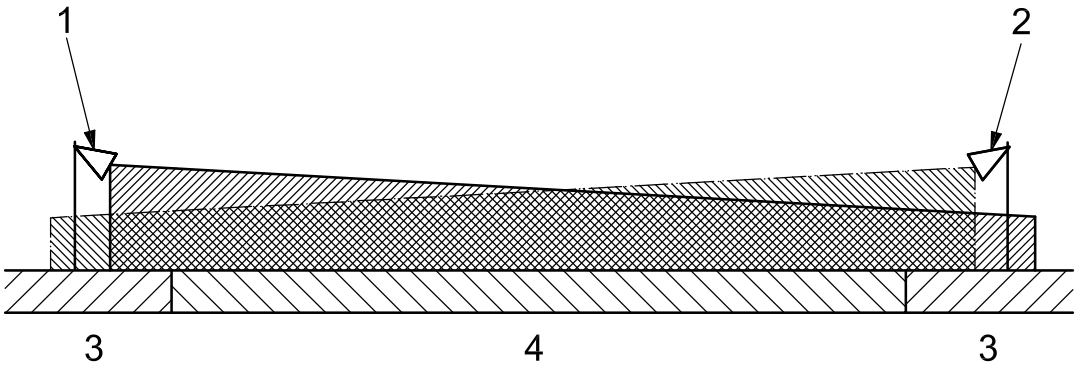
Figure 1 — Timing of sound emission for alternating signals



Key

1 sound emitter A
2 sound emitter A'
3 pavement/sidewalk
4 roadway

Figure 2 — Audible range for alternating signal (plan view)



Key

1 sound emitter A
2 sound emitter A'
3 pavement/sidewalk
4 roadway

Figure 3 — Audible range of alternating signal (side view)

4.4 Tactile walk initiation signal

4.4.1 Duration

The tactile walk initiation signal should remain actuated during the entire walk initiation period when the pedestrian traffic light is green.

4.4.2 Height of installation

The tactile walk initiation signal should be installed between 0,8 m and 1,2 m above the ground.

4.4.3 Tactile direction indicator

When a tactile walk initiation signal is used, it shall have a tactile direction indicator showing the direction of travel on the associated pedestrian crosswalk.

EXAMPLE The tactile direction indicator may be in the shape of an arrow.

4.5 The relationship between acoustic and tactile signals and traffic controllers

If there is a traffic controller malfunction, the acoustic and tactile signals shall be deactivated. When the pedestrian signal is deactivated, the acoustic and tactile signals shall be deactivated.

Bibliography

[1] ISO 1996-1:2003, *Acoustics — Description, measurement and assessment of environmental noise — Part 1: Basic quantities and assessment procedures*

[2] ISO 1996-2:2007, *Acoustics — Description, measurement and assessment of environmental noise — Part 2: Determination of environmental noise levels*

[3] ISO 3741:1999, *Acoustics — Determination of sound power levels of noise sources using sound pressure — Precision methods for reverberation rooms*

[4] ISO 3744:1994, *Acoustics — Determination of sound power levels of noise sources using sound pressure — Engineering method in an essentially free field over a reflecting plane*

[5] ISO 3745:2003, *Acoustics — Determination of sound power levels of noise sources using sound pressure — Precision methods for anechoic and hemi-anechoic rooms*

[6] ISO 11201:1995, *Acoustics — Noise emitted by machinery and equipment — Measurement of emission sound pressure levels at a work station and at other specified positions — Engineering method in an essentially free field over a reflecting plane*

[7] ISO 11202:1995, *Acoustics — Noise emitted by machinery and equipment — Measurement of emission sound pressure levels at a work station and at other specified positions — Survey method* in situ

[8] IEC 61672-1:2002, *Electroacoustics — Sound level meters — Part 1: Specifications*

[9] IEC 61672-2:2003, *Electroacoustics — Sound level meters — Part 2: Pattern evaluation tests*

ICS 11.180.15; 11.180.30

Price based on 8 pages