INTERNATIONAL STANDARD

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Assistive products for blind and vision-impaired persons — Tactile walking surface indicators

Produits d'assistance pour personnes aveugles ou visuellement affaiblies — Indicateurs tactiles de surfaces de marche

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Foreword

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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.

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ISO 23599 was prepared by Technical Committee ISO/TC 173, *Assistive products for persons with disability*.

Introduction

The purpose of this International Standard is to create requirements for tactile walking surface indicators (TWSIs) for blind or vision-impaired persons.

When blind or vision-impaired persons travel alone they might encounter problems and hazards in various situations. In order to obtain information for wayfinding, these pedestrians use information available from the natural and built environment, including tactual, acoustic and visual information. However, environmental information is not always reliable; it is for this reason that TWSIs perceived through use of a long white cane, through the soles of the shoes and through use of residual vision have been developed.

TWSIs were invented in Japan in 1965. They are now used around the world to help blind or vision-impaired persons to travel independently. At present, TWSI patterns and installation methods vary from country to country. This International Standard aims to provide a basis for a common approach for TWSIs at the international level, while acknowledging that some differences may be necessary at the local level to accommodate climatic, geographical, cultural or other issues that might exist.

TWSIs should be designed and installed based on a simple, logical and consistent layout. This will enable tactile indicators to facilitate not only the independent travel of blind or vision-impaired persons in places they frequently travel, but also to support their independent travel in places they visit for the first time.

Currently, there are several forms of TWSIs, but the ability to detect differences in tactile patterns through the soles of the shoes or the long white cane varies depending on individual differences. Therefore, the consolidated findings of science, technology and experience were employed to define the characteristics of TWSIs that can be detected and recognized by potential users. Additionally, in order to ensure that TWSIs achieve maximum effect in conveying information, it is important that they be installed in or on a smooth surface where blind or vision-impaired persons can identify them without interference from an irregular walking surface.

It is also necessary to ensure that TWSIs can be effectively used by vision-impaired persons as well as people who are blind. For this purpose, TWSIs should be easily detectable through use of residual vision. This is achieved through visual contrast between TWSIs and the surrounding or adjacent surface. Visual contrast is influenced primarily by luminance contrast, and secondarily by difference in colour or tone. In order to have good visibility, it is necessary to have sufficient illumination without glare and it is important to maintain the visual contrast between TWSIs and the surrounding or adjacent surface.

While TWSIs should be effective for blind or vision-impaired persons, attention should also be paid to their surface structure and materials in order to ensure that all pedestrians, including those with impaired mobility, can safely and effectively negotiate them.

TWSIs are installed in public facilities, buildings used by many people, railway stations and on sidewalks and other walking surfaces. Attention patterns may be installed in the vicinity of pedestrian crossings, at-grade kerbs, railway platforms, stairs, ramps, escalators, travelators, elevators, etc. Guiding patterns may be used alone or in combination with attention patterns in order to indicate the walking route from one place to another.

Assistive products for blind and vision-impaired persons — Tactile walking surface indicators

1 Scope

This International Standard provides product specifications for tactile walking surface indicators (TWSIs) and recommendations for their installation in order to assist in the safe and independent mobility of blind or vision-impaired persons.

This International Standard specifies two types of TWSIs: attention patterns and guiding patterns. Both types can be used indoors and outdoors throughout the built environment where there are insufficient cues for wayfinding, or at specific hazards.

Some countries have adopted other designs of TWSIs based on the consolidated findings of science, technology and experience, ensuring that they can be detected and distinguished by most users. National standards, regulations and guidelines governed by national legislation specify where TWSIs are to be used. This International Standard is not intended to replace requirements and recommendations contained in such national standards, regulations or guidelines.

2 Terms and definitions

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

2.1
attention pattern
TWSI design, calling attention to a hazard only, or to hazards and decision points

NOTE Attention patterns can be installed in the vicinity of pedestrian crossings, at-grade kerbs, railway platforms, stairs, ramps, escalators, travelators, elevators, etc.

2.2
at-grade kerb
flush kerb
kerb whereby the edge of the walkway is at the same level as adjoining vehicular ways

NOTE See Figures B.10 and B.11.

2.3
CIE Y value
tristimulus value Y of the CIE 1931 standard colorimetric system for reflecting objects

NOTE 1 The CIE Y value equals the percentage value of the luminous reflectance.

NOTE 2 $Y = 0$ denotes the reflectance of an absolutely black object (no light is reflected). $Y = 100$ denotes the reflectance of a perfectly white object (no light is absorbed or transmitted).

2.4
decision point
intersection or change of direction along a path of travel defined by TWSIs

2.5
discrete units
individual domes, cones or elongated bars that are embedded into the ground or floor surfaces

2.6
effective depth
distance between the detectable edges of the TWSIs when measured in the principal direction of travel

NOTE See Figure 1.

2.7
effective width
distance between the detectable edges of the TWSIs when measured perpendicular to the principal direction of travel

NOTE See Figure 1 and Figure 2.

2.8
guiding pattern
TWSI design, indicating a direction of travel or a landmark

NOTE Guiding patterns can be used alone or in combination with attention patterns in order to indicate the walking route from one place to another.

2.9
hazard
any area or element in, or adjacent to, a direction of travel, which may place people at risk of injury

2.10
illuminance
amount of luminous flux to a surface per unit area

NOTE 1 The SI unit for illuminance is lux (lx).

NOTE 2 See Reference [6] for further details.

2.11
integrated units
domes, cones or elongated bars on a base surface or plate, incorporated as a single unit

2.12
luminance
amount of light reflected or emitted from a surface in a given direction

NOTE 1 The SI unit for luminance is candela per square metre (cd/m^2).

NOTE 2 See Reference [6] for further details.

2.13
luminance contrast
value of comparison of the luminance of two surfaces

2.14
LRV
light reflectance value
proportion of visible light reflected by a surface at all wavelengths and directions when illuminated by a light source

NOTE 1 LRV is also known as the luminance reflectance factor.

NOTE 2 LRV is expressed on a scale of 0 to 100, with a value of 0 points for pure black and a value of 100 points for pure white.

2.15
reflectance
ratio of light reflected in a given direction by a surface

NOTE See Reference [6] for further details.

2.16
TWSI
tactile walking surface indicator
standardized walking surface used for information by blind or vision-impaired persons

2.17
truncated domes or cones
type of attention pattern also referred to as flat-topped domes or cones

3 General provisions

3.1 General principles

Wayfinding and mobility can be achieved through good design of facilities, including clear accessible paths of travel with built and natural guiding elements, such as edges and surfaces that can be followed tactually and visually. TWSIs should not be a substitute for poor design.

TWSIs shall be installed where no built or natural guiding elements can be provided.

Though TWSIs are used by blind or vision-impaired persons, the design and installation of TWSIs shall take into consideration the needs of people with mobility impairments.

a) All TWSIs shall:

— be easily detectable from the surrounding or adjacent surface by raised tactile profiles and visual contrast;

— maintain detectability throughout their lives;

— be designed to prevent tripping;

— be slip-resistant;

— be used in a logical and sequential manner;

— be installed consistently to enable them to be interpreted by users; and

— be of sufficient depth in the direction of travel to provide adequate detectability and appropriate response by the users, such as stopping and turning.

b) Attention TWSIs shall:

— be distinguishable from guiding TWSIs; and

— extend across the full width of an accessible path of travel and perpendicular to the direction of travel when approaching a hazard.

3.2 Detecting and distinguishing TWSIs

3.2.1 General

TWSIs shall be easily detectable from the surrounding or adjacent surface by raised tactile profiles and visual contrast. TWSIs shall be distinguishable from each other.

3.2.2 Tactile contrast

TWSIs shall be detectable by blind or vision-impaired persons through the soles of their shoes and by a long white cane.

When attention patterns and guiding patterns are combined, blind or vision-impaired persons shall be able to distinguish clearly between them, identify both and remember the meaning of each one.

Surrounding or adjacent surfaces shall be smooth to enable TWSIs to be detected and distinguished (see 4.2).

3.2.3 Visual contrast

TWSIs shall be readily detectable and distinguishable from the surrounding or adjacent surfaces by visually impaired people. Perception of visual contrast is enhanced by high illumination (see 4.3 and Annex A).

3.2.4 Design for prevention of tripping

Truncated domes or cones and elongated bars shall have bevelled or rounded edges to decrease the likelihood of tripping and to enhance safety and negotiability for people with mobility impairments.

4 Requirements and recommendations

4.1 Specifications for shape and dimensions of TWSIs

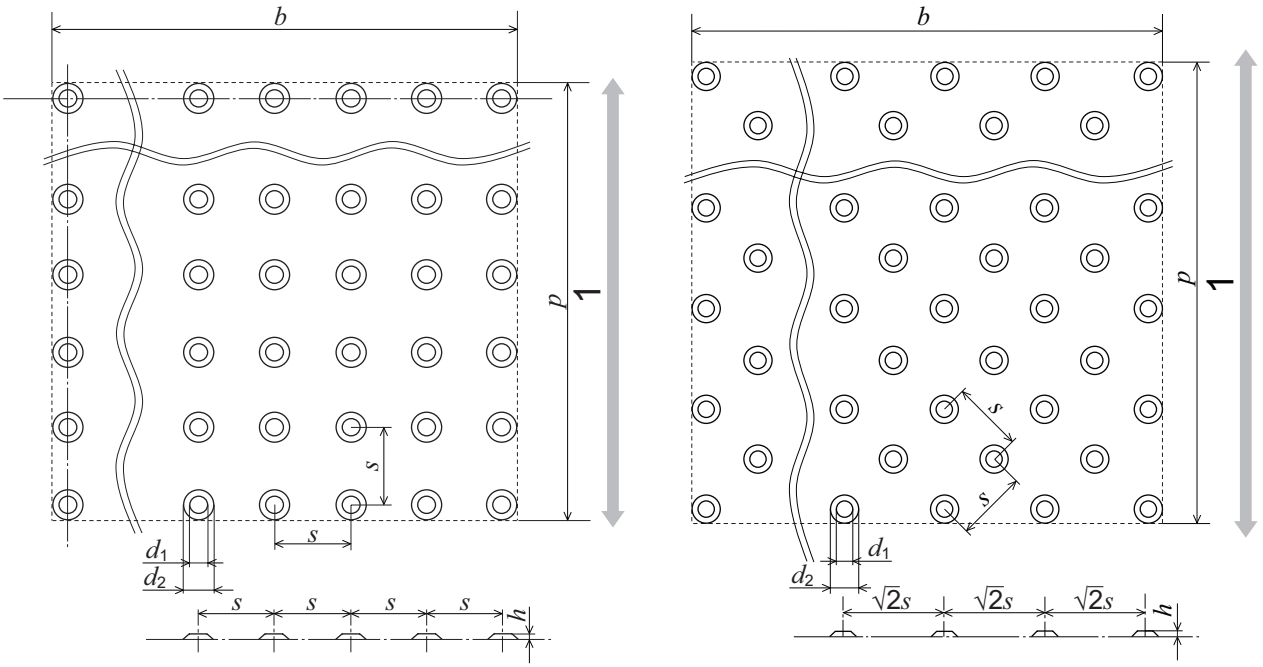
4.1.1 General

TWSIs shall be easily detectable from the surrounding or adjacent surface by raised tactile profiles. This can be achieved by complying with the shape and dimensions specified below.

4.1.2 Attention patterns

4.1.2.1 Arrangements

Truncated domes or cones should be arranged in a square grid, parallel or diagonal at 45° to the principal direction of travel (see Figure 1).



a) Parallel to the principal direction of travel

b) Diagonal at 45° to the principal direction of travel

Key

1 principal direction of travel
s spacing between the centres of adjacent truncated domes or cones
d_1 top diameter of truncated domes or cones
d_2 bottom diameter of truncated domes or cones
h height of truncated domes or cones
b effective width
p effective depth

Figure 1 — Spacing and dimensions of truncated domes or cones

4.1.2.2 Height

The height of truncated domes or cones shall be 4 mm to 5 mm (see Figure 2).

In indoor environments with exceptionally smooth surfaces, the minimum height of 4 mm may be preferable.

NOTE When truncated domes or cones are surrounded by exceptionally smooth surfaces, such as terrazzo, plastic or rubber, they can be detected more easily than when they are surrounded by rougher surfaces, such as brushed concrete, bricks or manufactured pavers. A height that is more than what is necessary for reliable detection can cause tripping.

4.1.2.3 Diameter

The top diameter of truncated domes or cones shall range from 12 mm to 25 mm, as shown in Table 1, and the bottom diameter of truncated domes or cones shall be (10 ± 1) mm greater than the top diameter (see Figure 1).

NOTE Systematic research[32][33] carried out on truncated domes or cones of various dimensions indicates that a top diameter of 12 mm is the optimal size for blind or vision-impaired persons to detect and distinguish through the soles of their shoes. Experiences indicate that the optimal top diameter for other groups within the community could be greater.

4.1.2.4 Spacing

The spacing refers to the shortest distance between the centres of two adjacent truncated domes or cones which may be parallel or diagonal at 45° to the direction of travel. The spacing shall be within the ranges shown in relation to the top diameter in Table 1. The tolerance of the top diameter shall be ±1 mm.

Table 1 — Top diameter and corresponding spacing of truncated domes or cones

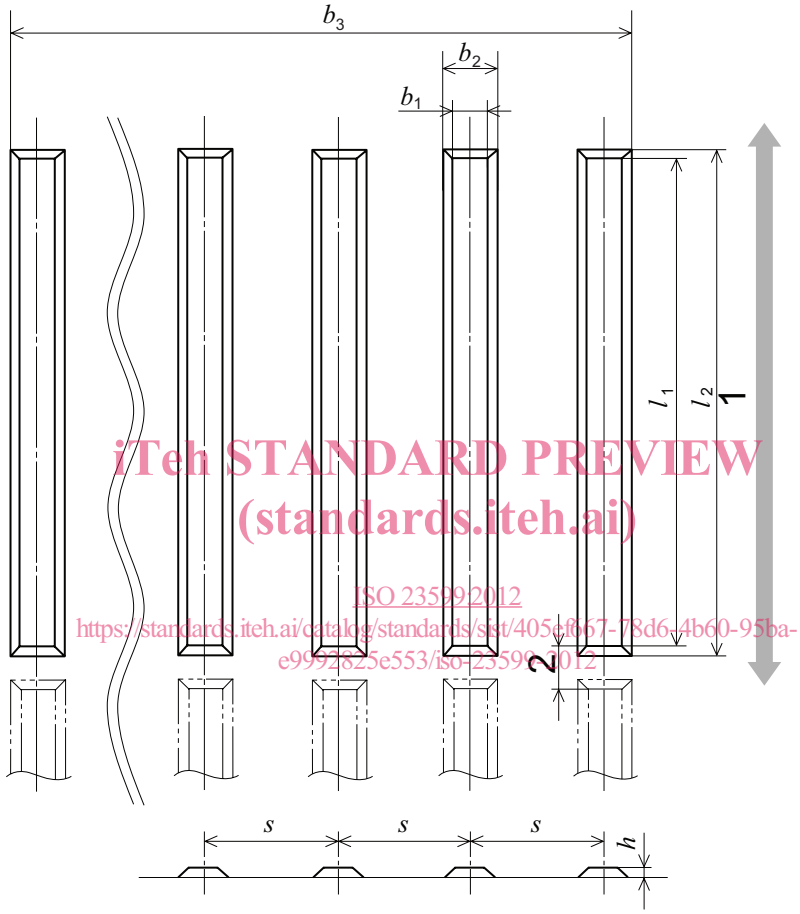
Top diameter of truncated domes or cones mm	Spacing mm
12	42 to 61
15	45 to 63
18	48 to 65
20	50 to 68
25	55 to 70

4.1.3 Guiding patterns

4.1.3.1 Arrangements

A guiding pattern shall be constructed of parallel flat-topped elongated bars (see Figure 2) or sinusoidal ribs (see Figure 3).

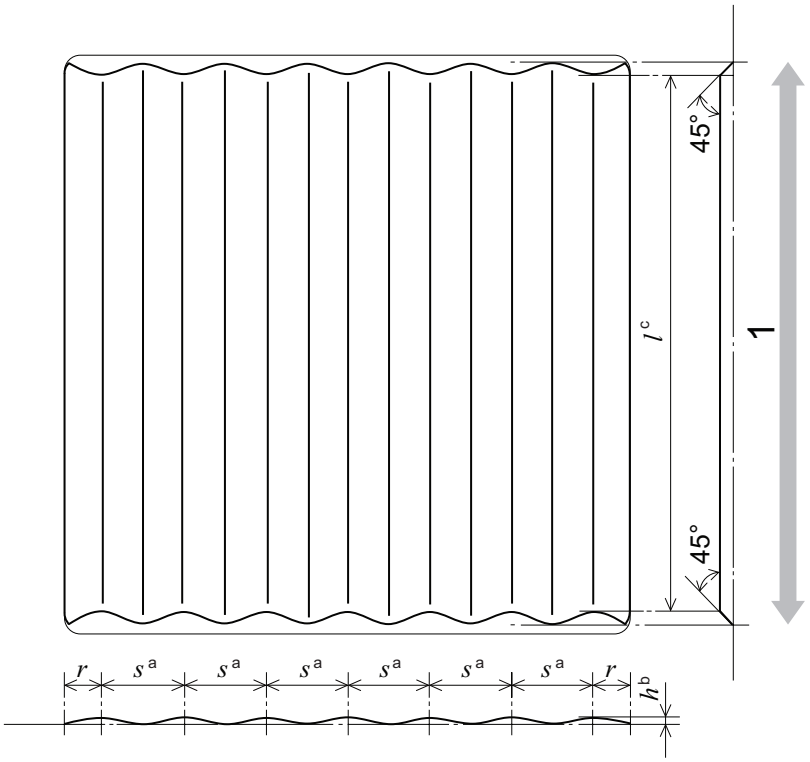
NOTE Flat-topped elongated bars are the most commonly used guiding pattern, though sinusoidal rib patterns are used in geographic areas where snow is common. Sinusoidal patterns are less easily damaged by snow ploughs than flat-topped bars.



Key

1 principal direction of travel
2 drainage gap between the top of flat-topped elongated bars
b_1 top width of flat-topped elongated bars
b_2 bottom width of flat-topped elongated bars
s spacing between the axes of adjacent flat-topped elongated bars
h height of flat-topped elongated bars
l_1 length of the top of flat-topped elongated bars
l_2 length of the base of flat-topped elongated bars
b_3 effective width

Figure 2 — Spacing and dimensions of flat-topped elongated bars



Key

1 principal direction of travel

r distance between the edge of the pattern and the axis closest to the edge (0,5 × *s*)

s spacing between the axes of adjacent sinusoidal ribs

h height of sinusoidal ribs

l length of the top of sinusoidal ribs

a 40 to 52 mm.

b 4 to 5 mm.

c ≥ 270 mm.

Figure 3 — Spacing and dimensions of sinusoidal ribs

4.1.3.2 Specifications for flat-topped elongated bars

4.1.3.2.1 Height

The height of flat-topped elongated bars shall be 4 mm to 5 mm (see Figure 2).

In indoor environments with exceptionally smooth surfaces, the minimum height of 4 mm may be preferable.

NOTE When flat-topped elongated bars are surrounded by exceptionally smooth surfaces, such as terrazzo, plastic or rubber, they can be detected more easily than when they are surrounded by rougher surfaces, such as brushed concrete, bricks or manufactured pavers. A height that is more than what is necessary for reliable detection can cause tripping.

4.1.3.2.2 Width

The top width of flat-topped elongated bars shall range from 17 mm to 30 mm, as shown in Table 2. The bottom width shall be (10 ± 1) mm wider than the top (see Figure 2).

NOTE Systematic research[32][33] carried out on flat-topped elongated bars of various dimensions indicates that a top width of 17 mm is the optimal size for blind or vision-impaired persons to detect and distinguish through the soles of their shoes. Experiences indicate that the optimal top width for other groups within the community could be greater.