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Accessibility and usability of the built environment — Technical performance criteria and specifications

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National foreword

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A list of organizations represented on this committee can be obtained on request to its committee manager.

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June 2021

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English version

Accessibility and usability of the built environment - Technical performance criteria and specifications

Accessibilité et utilisabilité de l'environnement bâti - Critères et spécifications de performance technique

Barrierefreiheit und Nutzbarkeit der gebauten Umgebung - Technische Leistungskriterien und Anforderungen

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European foreword

This document (CEN/TR 17621:2021) has been prepared by the Joint Technical Committee CEN-CENELEC/JTC 11 “Accessibility in the built environment”, the secretariat of which is held by UNE.

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

This document has been prepared under Mandate M/420 given to CEN, CENELEC and ETSI by the European Commission and the European Free Trade Association in support of European accessibility requirements for public procurement in the built environment.

Any feedback and questions on this document should be directed to the users’ national standards body/national committee. A complete listing of these bodies can be found on the CEN and CENELEC websites.

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Introduction

This document exemplifies the technical performance criteria and specifications to fulfil the functional requirements given in the European Standard EN 17210. It demonstrates a proposal, or proposals, to achieve the EN requirements and recommendations, drawing on performance criteria and specifications given in International Standard ISO 21542, where these exist and/or with examples from other standards and guidance documents, where relevant.

Alternatively, national standards or regulations may be used to determine the technical performance criteria and specifications to fulfil the functional requirements of the EN 17210.

Another CEN-CENELEC Technical Report (CEN/TR 17622) will detail the assessment of conformity to the functional requirements given in the European Standard EN 17210.

This document is intended to be read alongside EN 17210. The structure in CEN/TR 17621 follows the EN structure, listing the equivalent headings, clauses and bullet points (a), b), c) etc.) and providing a way, or ways, to achieve the functional requirements and recommendations.

Where there are no technical criteria related to the EN clause / sub-clause, such as the Rationale, this is stated rather than leaving this blank.

Technical performance criteria and specifications from ISO 21542:2011 are used in the CEN/TR 17621 as the main source of information, and this is not referenced as the source each time, as this would be repetitive. When the source is ISO 21542:2021 (Enquiry version) we include this source in brackets, and other sources are also referenced.

Other sources are used where these have been identified as providing information not covered in ISO 21542 or useful supplementary information.

Additional sources include:

— EN 16584-1, *Railway applications – Design for PRM use – General requirements – Part 1: Contrast,*

— EN 16584-2, *Railway applications – Design for PRM use – General requirements – Part 2: Information.*

— EN 16584-3, *Railway applications – Design for PRM use – General requirements – Part 3: Optical and friction characters.*

— EN 16587, *Railway applications – Design for PRM use –Requirements for obstacle free routes for infrastructure,*

— Other specific ENs and product related ENs,

— National standards,

— Guidance on a specific matter.

See also the Bibliography.

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1 Scope

This document has been developed to support EN 17210, “Accessibility and usability of the built environment – Functional requirements”. This document provides and exemplifies technical performance criteria and specifications for an accessible and usable built environment, following the Design for All/Universal design principles. The document specifies what is necessary to align with these principles which will facilitate equitable and safe use for a wide range of users.

The technical performance criteria and specifications are applicable across the full spectrum of the built environment and can be used as criteria for awarding public contracts (in support of the Public Procurement Directives).

These technical performance criteria and specifications are specifically applicable to the design, construction, refurbishment or adaptation, and maintenance of public or public-use environments including external areas.

Alternatively, national standards and regulations can determine the technical performance criteria and specifications to fulfil the functional requirements of EN 17210.

NOTE 1 Design for All and Universal Design share a similar inclusive design philosophy. Universal Design means the design of products, environments, programmes and services to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design. Universal Design does not exclude assistive devices for particular groups of persons with disabilities where this is needed (UN CRPD).

NOTE 2 Terms such as "design for all", "universal design", "accessible design", "barrier-free design", "inclusive design" and "transgenerational design" are often used interchangeably with the same meaning.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

EN 17210, *Accessibility and usability of the built environment - Functional requirements*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 17210 and the following apply:

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
light reflectance value
LRV
proportion of visible light reflected by a surface at all wavelengths and directions when illuminated by a light source

Note 1 to entry: *LRV* is also known as the luminance reflectance factor or CIE Y value (see International Commission on Illumination, CIE, Publication 15:2004, 3rd Edition, *Colorimetry*).

Note 2 to entry: The *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.

[SOURCE: ISO 21542:2011, definition 3.41]

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3.2
luminance contrast
luminance of one surface or component compared to the luminance of the background or adjoining surface

[SOURCE: ISO 21542:2021, 3.28, modified]

4 Legal and policy background and associated benefits

See EN 17210, no applicable technical specification.

5 Diversity of users and design considerations

See EN 17210, no applicable technical specification.

6 Wayfinding

6.1 Wayfinding, orientation and navigation

6.1.1 Rationale

See EN 17210, no applicable technical specification.

The functional requirements and recommendations in EN 17210 can be achieved by providing:

6.1.2 General

This is an overview of 6.2 to 6.8.

6.2 Wayfinding information

6.2.1 Rationale

See EN 17210, no applicable technical specification.

The functional requirements and recommendations in EN 17210 can be achieved by providing:

6.2.2 General

a) Information that is regularly monitored for accuracy and checked with users of the environment for usefulness. See also Figure 1.

b) Priority of safety information, followed by information for wayfinding, then general and instructional information, though, for instance, relative size and positioning of visual information, and ordering of audible information with safety first etc. These are to stand out from advertising information.

c) Only one key message for each announcement or sign, using short sentences or phrases.

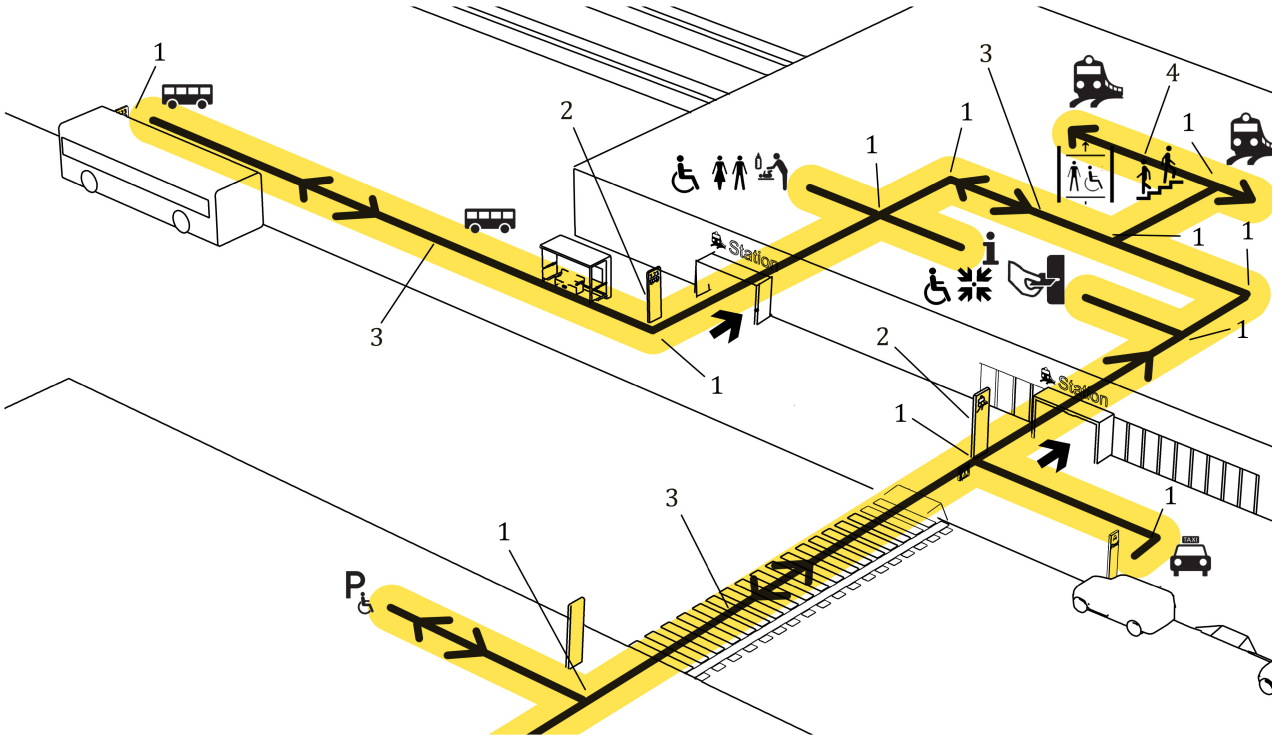
d) Consistent information along a route including at decision points, for instance using the same term for ‘Meeting room 1’ along a route and at the destination, not changing to Training Room on arrival.

e) Short words avoiding abbreviations; with a clear meaning checked to ensure understood by users.

f) The same information through a range of formats such as audible, visual, tactile.

g) See 6.7 Graphical symbols.

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Key

1 decision points with consistent information, minimum for every 50 m (EN 16587)
2 limited number of pictograms in signage on a single location (EN 16587)
3 tactile and visually contrasting routes (EN 16587)
4 audible information with requirements to speech intelligibility (EN 16587)

Figure 1 — Examples of wayfinding features on accessible routes in railway infrastructure

6.3 Visual contrast

6.3.1 Rationale

See EN 17210, no applicable technical specification.

The functional requirements and recommendations in EN 17210 can be achieved by providing:

6.3.2 General

Visual contrast according to the area and visual task in a) to c). Visual contrast is specified and measured in various ways in different European countries.

a) For large area surfaces (i.e. walls, floors, doors, ceiling) and to facilitate orientation and guiding (i.e. handrails, door furniture, and visual indicators on glazed areas) a visual contrast value of:

   — Using Michelson method, a luminance contrast C_M ≥ 30 % between the two surfaces, with *LRV* of the lighter surface ≥ 40 points; or

   — Using the Weber method, a luminance contrast C_W ≥ 45 % between the two surfaces, with *LRV* of the lighter surface ≥ 40 points; or

   — Using *LRV* difference method, a difference in *LRV* ≥ 30 points between the two surfaces; with *LRV* of the lighter surface ≥ 40 points.

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b) For potential hazards, (i.e. visual indicator on steps and glazed doors), small items (i.e. switches and controls) and self-contrasting markings a high visual contrast value of:

— Using Michelson method, a luminance contrast C_M ≥ 60 % between the two surfaces, with *LRV* of the lighter surface ≥ 50 points; or

— Using the Weber method, a luminance contrast C_W ≥ 75 % between the two surfaces, with *LRV* of the lighter surface ≥ 50 points; or

— Using *LRV* difference method, a difference in *LRV* ≥ 60 points between the two surfaces or between the potential hazard and background surface.

c) To facilitate reading of signs, information and instructions, a high contrast value of:

— Using Michelson method, a luminance contrast C_M ≥ 60 % between the text or symbols and the background, with *LRV* of the lighter surface ≥ 70 points; or

— Using the Weber method, a luminance contrast C_W ≥ 75 % between the text or symbols and the background, with *LRV* of the lighter surface ≥ 70 points; or

— Using *LRV* difference method, a difference in *LRV* ≥ 60 points between the text or symbols and the background; with *LRV* of the lighter surface ≥ 70 points.

See Annex A for charts showing examples of the application of visual contrast using these methods.

Where reflecting materials with highly glossy or shiny surfaces are used for one or both surfaces of interest, e.g. brushed metal, a higher minimum luminance contrast value is required than for non-reflecting materials:

Large surface areas (i.e. walls, floors, doors, ceiling), elements and components to facilitate orientation (i.e. base plates of controls), C_M ≥ 40 % with a minimum *LRV* of the lighter surface ≥ 40 points (C_W ≥ 57 %, *LRV* difference ≥ 40 points).

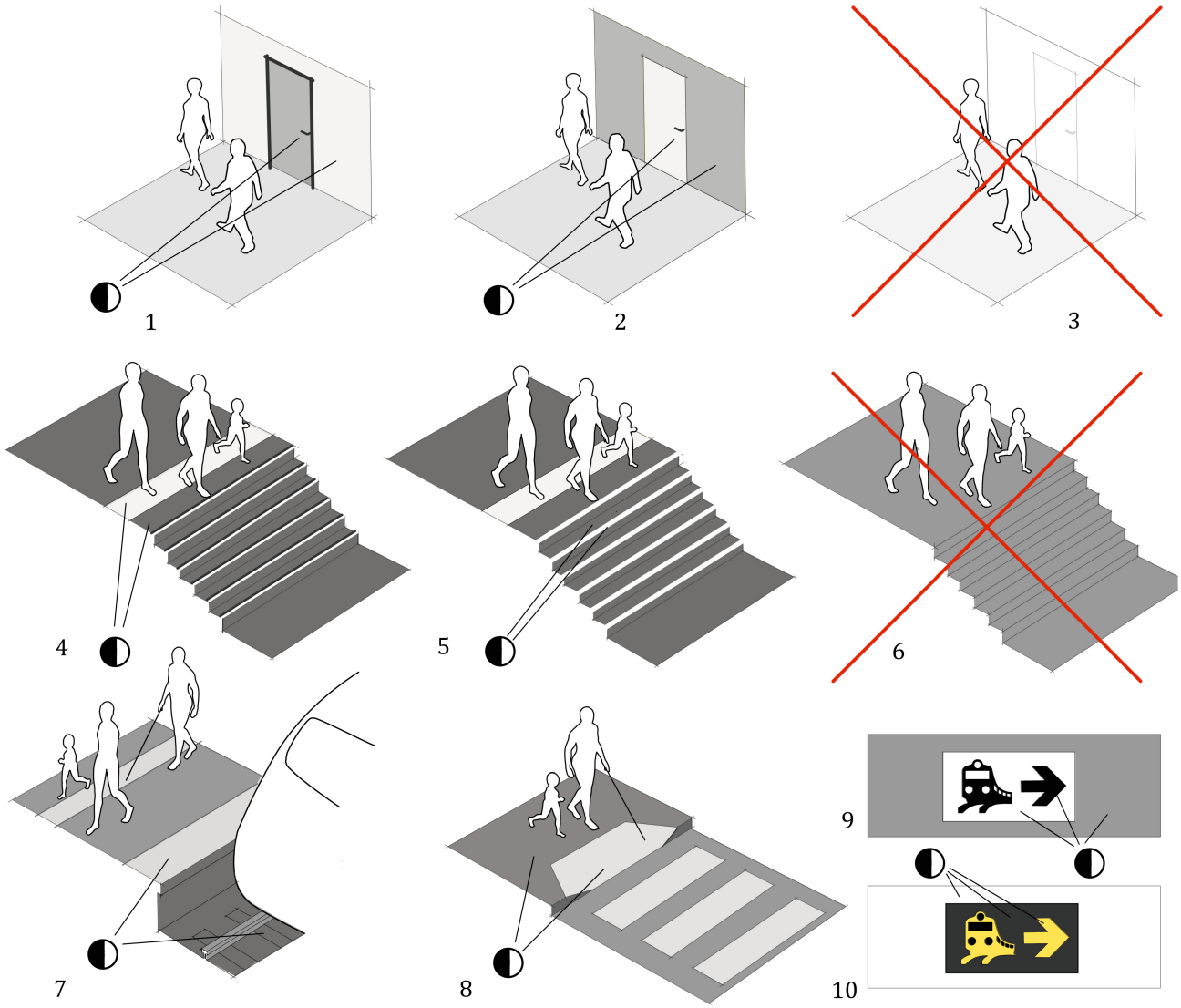
Small items necessary to enable use of building elements (i.e. control buttons, inscriptions on controls), C_M ≥ 70 % with a minimum *LRV* of the lighter surface ≥ 70 points, (C_W ≥ 82 %, *LRV* difference ≥ 70 points).

See ISO 21542:2021, 10.3.3. For stainless steel, see also EN 16584-1.

For the application of visual contrast on elements see the specific clauses such as 6.6 Signage; 7.1 Accessible routes; 9.3 Doors and door frames; 10.2 Steps and stairs; 10.3 Handrails; 10.4 Lifts, 10.5 Vertical and inclined lifting platforms, 10.6 Escalators and moving walks and 12 Sanitary accommodations.

See also Figure 2 and Figure 3.

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Key

1 light wall with contrast C_M ≥ 30 % (*LRV* difference ≥ 30 points) to darker door

2 grey wall with contrast C_M ≥ 30 % (*LRV* difference ≥ 30 points) to lighter door

3 not recommended: contrast C_M between wall and door less than 30 %

4 light tactile walking surface indicator with contrast C_M ≥ 50 % (*LRV* difference ≥ 50 points) to dark first step of stairs

5 dark step surface with contrast C_M ≥ 60 % (*LRV* difference ≥ 60 points) to light step nosing marking

6 not recommended: no step surface contrast to step nosings

7 light attention pattern on railway platform with contrast to dark area outside platform (EN 16584-1)

8 light kerb ramp with contrast C_M ≥ 50 % (*LRV* difference ≥ 50 points) to footpath

9 dark text or pictograms with contrast C_M ≥ 60 % (*LRV* difference ≥ 60 points) to white background, signage mounted on dark wall

10 light text or pictograms with contrast C_M ≥ 60 % (*LRV* difference ≥ 60 points) to dark background, signage mounted on light wall

Figure 2 — Examples of use of visual contrast in built environments

See Annex A with examples of visual contrast charts.

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Figure 3 — Examples of visual contrast of door handles to surrounding areas (EN 16584-1)

6.3.3 Achieving and maintaining visual contrast

a) Where visual contrast is likely to deteriorate through, for example, cleaning of high trafficked floor surfaces; or weathering of outdoor surfaces for example asphalt can appear lighter over time and visual contrast reduced; or where lighting levels are low or subject to variation through changes in natural or artificial lighting levels; a higher contrast value at installation allows for this. For large areas, a luminance contrast $C_M \geq 40$ % (*LRV* difference ≥ 40 points) between the two surfaces, with *LRV* of the lighter surface ≥ 40 points; and for small items and potential hazards $C_M \geq 70$ % (*LRV* difference ≥ 70 points), with *LRV* of the lighter surface ≥ 70 points.

b) Regular checks of visual contrast levels in safety situations such as railway platforms and step nosings; to ensure high visual contrast is maintained for small items such as text, characters and symbols on signs, and for characters on small control buttons and operating mechanisms; and to ensure effective visual contrast is maintained where lighting levels are low.

c) A visual contrast equivalent to less than 20 points difference on the *LRV* scale throughout the different colours in a patterned floor surface.

6.3.4 Lighting and wayfinding

a) and b) See 15.1 Lighting.

6.3.5 Visual indicators on glazing

6.3.5.1 Rationale

See EN 17210, no applicable technical specification.

The functional requirements and recommendations in EN 17210 can be achieved by providing:

6.3.5.2 General

a) Uninterrupted visual indicators of at least 75 mm height placed at a height of 900 mm to 1 000 mm and 1 500 mm to 1 600 mm above floor level. An additional visual indicator placed at a height of 100 mm to 300 mm is recommended. See 9.3.11 Glazed doors and panels.

NOTE Partially sighted persons can have a limitation of visual field, which results in looking down at an angle of 45 ° to 50 °. When they are within 1 000 mm to 1 500 mm from a fully glazed door or sidelight, they can detect the visual barrier at a height of 900 mm to 1 000 mm, provided the visual contrast criteria have been applied to the background. The background in all cases is the circulation space on the opposite side of the glass door.

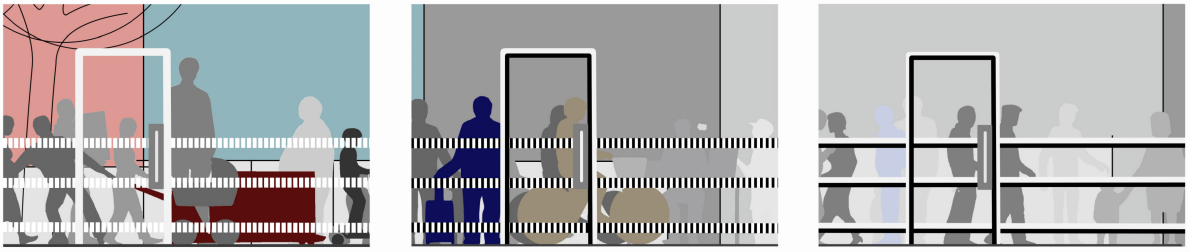
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Visual indicators on general glazed areas with a difference in visual contrast $C_M \geq 30\ \%$ (LRV difference ≥ 30 points) to the background, with LRV of the lighter surface ≥ 40 points. Visual indicators consisting of two separate colours, or two shades of the same colour, with a visual contrast $C_M \geq 60\%$ / $C_W \geq 75\%$, and LRV of the lighter surface ≥ 50 points (LRV difference ≥ 60 points) are preferred as they enable lighting conditions and backgrounds from either side of the glazing to be taken into account (ISO 21542: 2021, 8.1.1.4; EN 16584-1:2017, Annex B.6).

Visual indicators may also take the form of a broken line, sign, logo, or patterning on the glass with the visually contrasting indicator covering at least 75 % of the 100 mm indicator zone. For two-tone indicators each of the two colours or shades covers at least 30 % of the zone with a combined total of 75 % of the zone (EN 16584-1:2017, Annex B.6).

b) A visually contrasting strip on the edge of any free-standing glazed screens with a visual contrast $C_M \geq 60\%$ / $C_W \geq 75\%$, and LRV of the lighter surface ≥ 50 points to the background (LRV difference ≥ 60 points). See 9.3.11 Glazed doors and panels.

See Figure 4, Figure 5 and Figure 6.

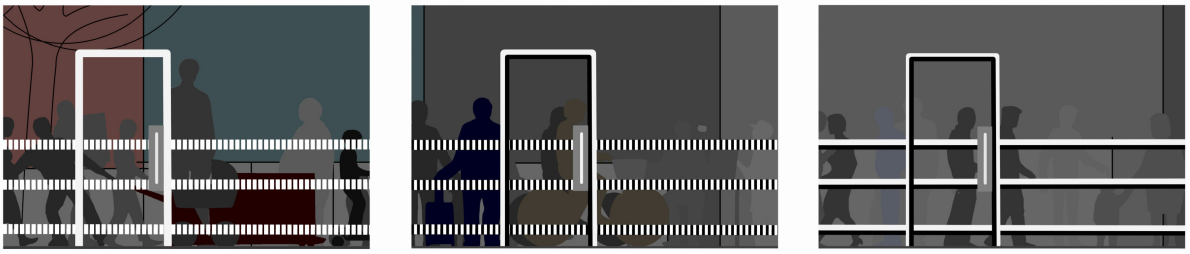


a) light 75 % coverage bands on shifting background

b) self-contrasting full coverage bands on shifting background

c) self-contrasting full coverage bands on low contrast background

Figure 4 — Examples of visually contrasting markings on different backgrounds, daylight conditions



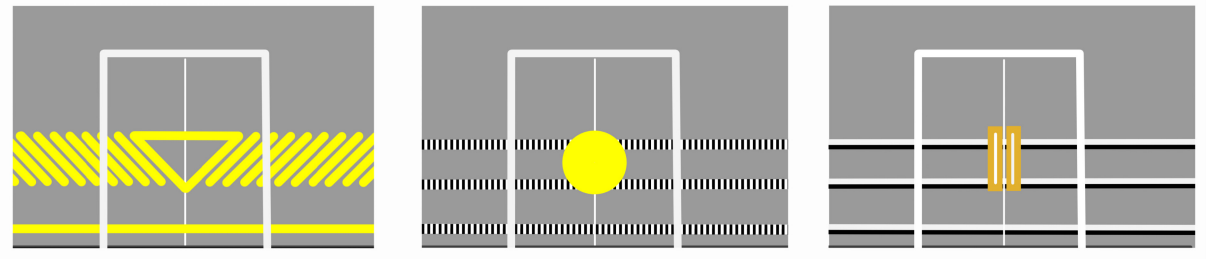
a) light 75 % coverage bands on dark background

b) self-contrasting full coverage bands on dark background

c) self-contrasting full coverage bands on dark background

Figure 5 — Examples of visually contrasting markings on different backgrounds, low light conditions

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a) pattern change indicating location of sliding door opening

b) large size marking indicating location of sliding door opening

c) door handle locations enhanced through contrasting background

Figure 6 — Examples of visually contrasting markings enhancing where sliding doors and manual doors open

6.4 Tactile information

6.4.1 Rationale

See EN 17210, no applicable technical specification.

The functional requirements and recommendations in EN 17210 can be achieved by providing:

6.4.2 General

a) See 6.4.3 Tactile floor surfaces and 6.6.11 Provisions of raised tactile letters and Braille signs. For tactile controls and push buttons, for example in lifts, see 10.4.12 Control devices and signals.

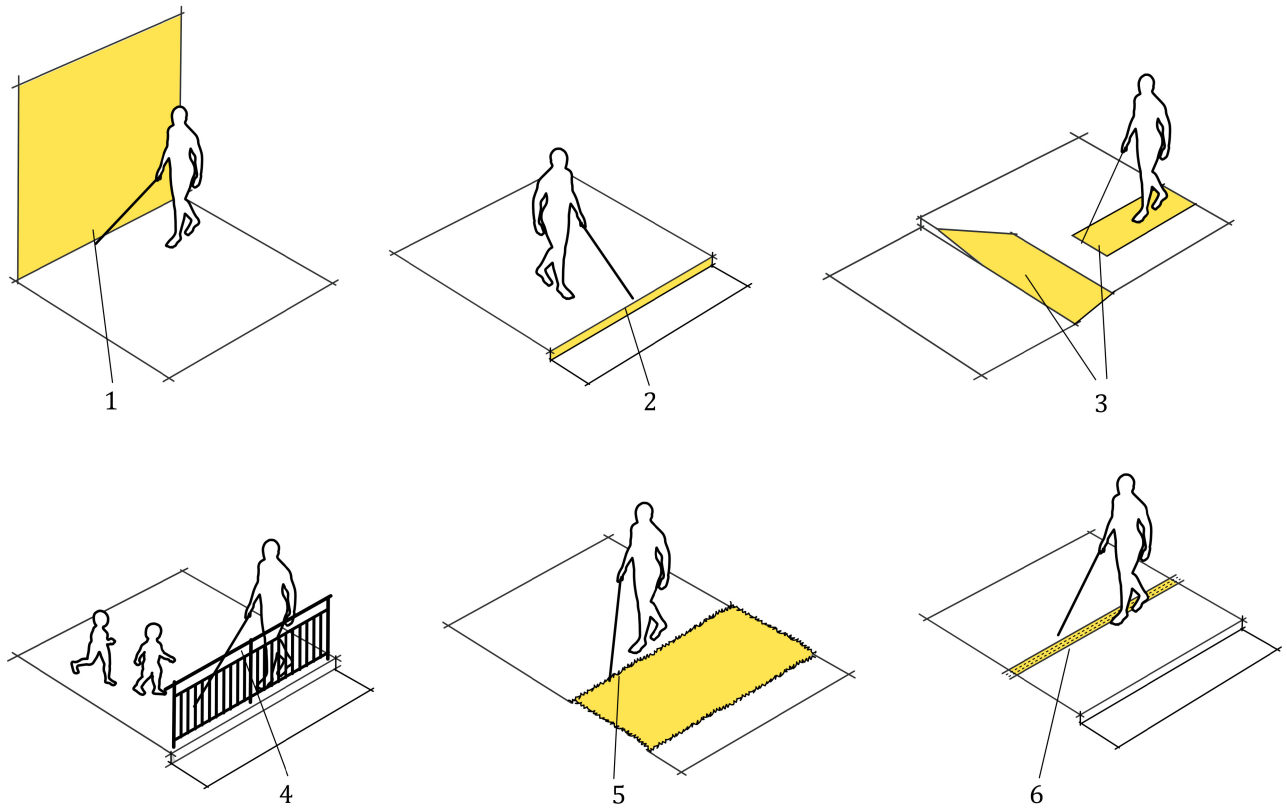
b) See 6.6.11 Provision of raised tactile and Braille signs.

c) See 6.4.3 Tactile floor surfaces and 6.6.11 Provision of raised tactile and Braille signs.

d) Regular checks to ensure that visual and tactile contrast is maintained

See also Figure 7.

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Key

1 wall of building or kerb upstand
2 kerb
3 tactile walking surface indicators at pedestrian crossings and kerb ramps
4 guarding between footpath and road
5 difference in surface between grass and tarmac
6 tactile surface indicators along footpath

Figure 7 — Examples of natural and built tactile elements used for guidance, warning or information

6.4.3 Tactile floor surfaces

6.4.3.1 Rationale

See EN 17210, no applicable technical specification.

The functional requirements and recommendations in EN 17210 can be achieved by providing:

6.4.3.2 Tactile Walking Surface Indicators (TWSI)

a) Profile height, which is the distance of the top of the raised profile above the upper face of the tactile paving unit, of 4 mm to 5 mm with a tolerance of 0,5 mm and bevelled or rounded edges to reduce the likelihood of tripping and to enhance safety and negotiability for people with mobility impairments. The base surface of the TWSI unit less than 3 mm above the surrounding ground or floor surface so that TWSIs do not cause a tripping hazard. For other design and dimension details see ISO 23599 or FprCEN/TS 15209:2020.

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Surrounding or adjacent surfaces to be smooth and free of any tactile structure disturbing detection. Gaps between joints to be avoided or a maximum of 10 mm width and 2 mm depth. For paving units with bevelled edges measure the width of the gap on top of the paving surface.

When the surface surrounding the TWSI is uneven, with gaps in the paving in over 6 % of the surrounding surface, provide a smooth surface on all sides of the TWSI extending to a minimum width of 600 mm (ISO 23599: 2019).

NOTE 1 ISO 23599 specifies two types of TWSI, attention patterns which are also known as hazard warning patterns, and guidance patterns, and recognizes that in some countries additional patterns are used for different purposes. Attention patterns comprise truncated domes or cones, referred to as blister surface in FprCEN/TS 15209; guidance patterns comprise elongated bars, referred to as rib surfaces in FprCEN/TS 15209.

NOTE 2 The provision of TWSIs differs between countries and can be determined by national regulations or standards; including when to provide, the design, profile and layout of the surfaces.

NOTE 3 In some countries a TWSI has a reduced profile indoors of 3.5 ± 0.5 (ÖNORM V 2102:2018, 6.1.1).

NOTE 4 A guidance pattern with recessed profile is used in some countries that experience a lot of snow and use of snow ploughs which may reduce the tactile properties of raised tactile profile. The profile depth is 4,5 ± 0,5 mm outdoors and in traffic structures. Recessed profiles need regular cleaning to avoid filling with dirt impacting on detectability of the profile (ÖNORM V 2102:2018, 6.1.1).

b) A visual contrast of $C_M \geq 30$ % (*LRV* difference ≥ 30 points) between the TWSI and the surrounding ground or floor surface, with *LRV* of the lighter surface ≥ 40 points. When used to warn of a hazard, a visual contrast of $C_M \geq 50$ % with *LRV* of the lighter surface ≥ 50 points (*LRV* difference ≥ 50 points), (ISO 23599). Adjacent surfaces or other surrounding surfaces free of any visual pattern that may conflict with identifying the TWSI. When the required visual contrast between TWSIs and surrounding surfaces cannot be achieved, a visually contrasting continuous band of minimum 100 mm in width around the TWSI.

c) When used to indicate a hazard, the attention pattern TWSI extending across the full width of the hazard or indicated element and for a minimum depth of 560 mm, preferably more; and set back a minimum distance of 300 mm from the hazard, or as specified in a particular country. When used for guidance, a TWSI that is at least 560 mm enables this to be detected when approached.

d) Metal tactile paving surfaces can be, or appear to be, slippery especially when wet so avoid using these or treat them so that they are not slippery and appear matte. See 9.6 Surface finishes and materials. Metal tactile paving surfaces that store heat or cold may burn the paws of assistance dogs.

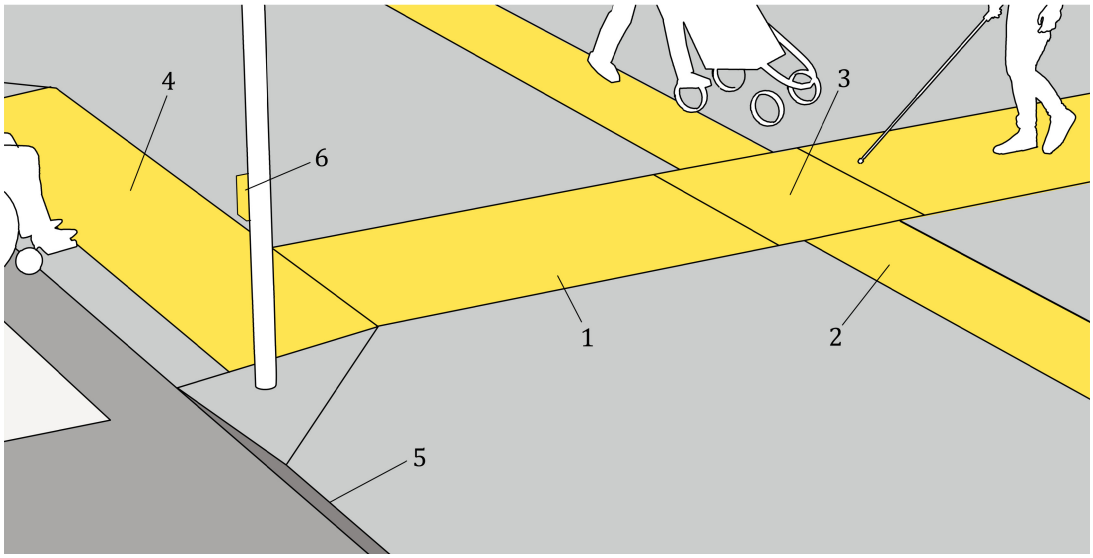
e) Similar slip resistance characteristics between the TWSI and adjacent surfaces. See BS 8300-1:2018, Annex F. Assessment according to national or international standards. (EN 16584-3:2015, 5.2.2 and CEN/TS 16165).

f) A distinct difference in tactile profile and visual contrast between two adjacent TWSI with different meaning such as guidance and attention pattern. Separate guiding TWSI from attention TWSI by an area 300 mm to 500 mm depth of smooth, unobstructed paving. Alternatively, when the guidance is to a danger zone, such as to a road crossing, top of a flight of steps, a train platform edge, or other hazard, attention pattern (hazard warning) TWSI could be used as the guidance path. See Figure 8 and Figure 26 in 7.3 Pedestrian crossings.

g) Regular checks that wayfinding information provided by TWSI is consistent with other wayfinding information such as signs, particularly when layouts and uses of areas change.

See also Figure 8, Figure 9 and Figure 10.

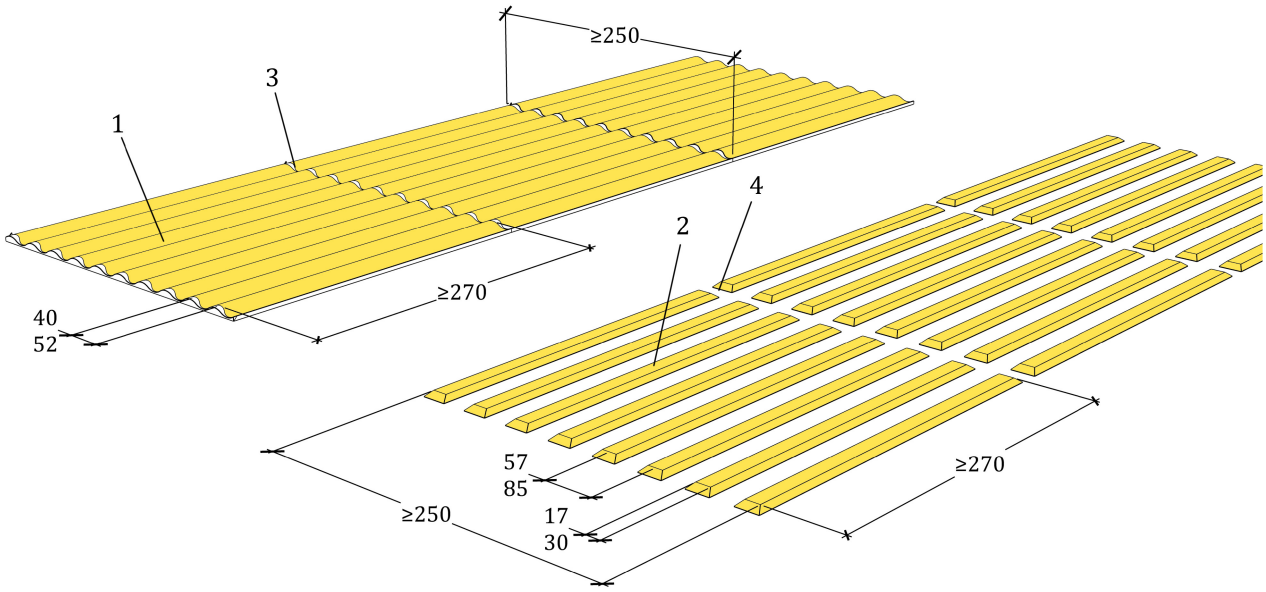
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Key

1 attention pattern leading to crossing
2 guidance pattern for indication of a route
3 attention pattern for indication of decision point or change of direction
4 attention pattern on kerb ramp, set back from kerb
5 full height kerb
6 pole with activation of audible signal

Figure 8 — Example use of Tactile Walking Surface Indicators (TWSI)



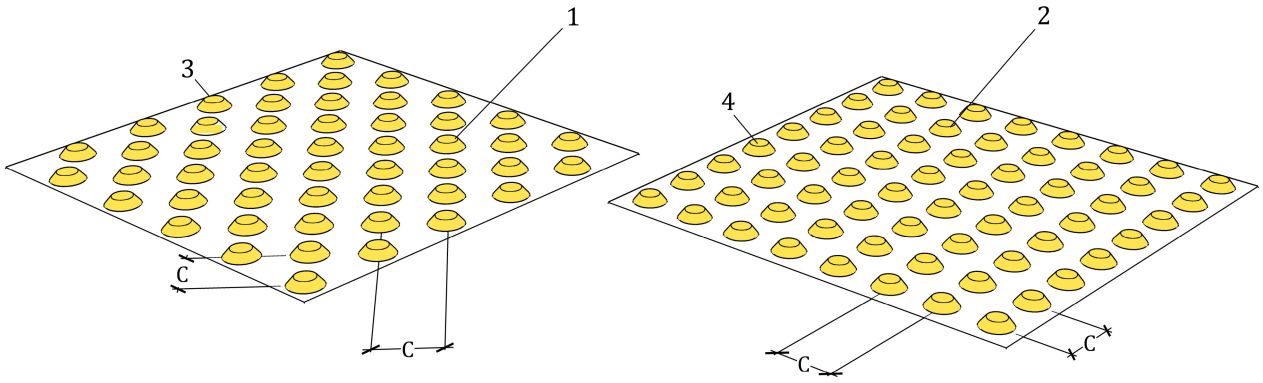
Key

1 sinusoidal rib pattern, 4 mm to 5 mm high
2 flat-topped elongated bars, 4 mm to 5 mm high, bevelled 45 degrees
3 drainage opening in sinusoidal bars
4 drainage opening 15 mm to 30 mm

Figure 9 — Example of attention pattern based on ISO 23599

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Key

1 domes arranged in diagonal rows
2 domes arranged in square grid
3 dome height 4 mm to 5 mm, top diameter 12 mm to 25 mm, diameter at base 25 mm to 50 mm
C distance centre to centre 41 mm to 70 mm

Figure 10 — Examples of attention patterns based on ISO 23599

6.4.4 Tactile maps, models and floor plans

a) See 6.4.3 Tactile floor surfaces.

b) Tactile maps angled between 20 ° to 30 ° from the horizontal for ease of reading, with the bottom edge at a minimum height of 900 mm. Vertically installed tactile maps on walls with a recommended centre height of 1 400 mm above the floor. The recommended maximum size of the map 600 mm high x 1 000 mm width (ISO 19028:2016). See also Figure 11.

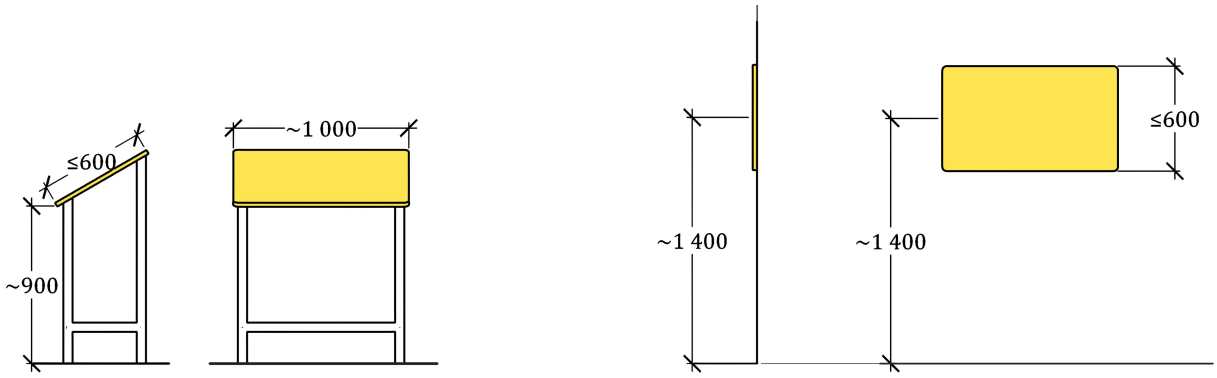


Figure 11 — Examples of angled and vertically positioned tactile maps (ISO 19028:2016, Figure 1 rev.)

c) An illumination level between 350 lux and 450 lux, without glare, at tactile maps.

d) Braille and tactile letters, figures and symbols in accordance with 6.6 Signage. The key to be located at the bottom of the map and left justified. The use of a recessed or raised Braille locator on the left-hand side to assist in locating the legend. The map is to be orientated with the building.

e) Only essential information for wayfinding in tactile and Braille. See ISO 19028 for more details.

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6.5 Audible information and hearing enhancement

6.5.1 Rationale

See EN 17210, no applicable technical specification.

The functional requirements and recommendations in EN 17210 can be achieved by providing:

6.5.2 General

a) Regular checks to ensure that audible information is:

   — Consistent with the message provided by tactile information particularly when there are changes in layouts which affect potential hazardous situations;

   — See 10.4.10 Alarm system and communication with two-way audible communication in lifts; 12.1.2 for audible (and visual) feedback to indicate that the call for assistance has been acknowledged and action has been taken; 16.2.8 Accessible guest rooms for assistive devices for persons with hearing impairments, such as vibrating/flashing alarm clock, vibration pads etc. compatible with the telephone and fire alarm system;

   — Consistent with visual information.

b) See EN 17210, no applicable technical specification.

c) See 15.2 Acoustics.

d) Regular checks to ensure that both audible and visual interactive elements are working on facilities such as intercom entry systems.

e) Clear signs in accordance with 6.6 Signage.

6.5.3 Hearing enhancement

a) Hearing enhancement system (e.g. wired induction loop, neck loop connected to FM receiver, infrared receiver, Wi-Fi receiver or other system) satisfying the technical performance criteria of EN 60118-4. The type and placement of hearing enhancement systems to be established at an early stage in the design of a premises. Line input sockets in accessible locations so that audio sound, or the speech dedicated channel of films, presentations, or video soundtracks, can be fed into the hearing enhancement system. (BS 8300-2:2018, 13.2, and Annex D1, Table D.1, D.4). Rooms or spaces with a hearing enhancement scheme, such as an induction loop, should clearly indicate this with the appropriate pictogram sign.

   See 17.2 Auditoriums, concert halls and similar; 17.7 Sports facilities; 18.2 Conference venues and 18.5 Educational buildings.

b) See 15.2 Acoustics.

c) See 11.1 Service counters for information, ticketing and reception.

d) Clear signs in accordance with 6.6 Signage.

e) See EN 60118-4.

f) and g) See EN 17210, no applicable technical specification.

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6.6 Signage

6.6.1 Rationale

See EN 17210, no applicable technical specification.

The functional requirements and recommendations in EN 17210 can be achieved by providing:

6.6.2 General

a) Signs with short sentences and simple words; avoid abbreviations and very long words. Time information presented in the 24 hour format.

b) For pictograms see ISO 7000, ISO 7001, ISO 7010, ISO 16069 and ISO 28564-1

c) See 6.6.11 Provision of raised tactile and Braille signs.

d) See EN 17210, no applicable technical specification.

6.6.3 Placement of signs

a) See EN 17210, no applicable technical specification.

b) Orientation signs and plans for buildings and outdoor environments located adjacent to main accessible routes with no change in level from the accessible route, in a space large enough for people to congregate including wheelchair users and space for people with a companion, sighted guide or assistance dog. Manoeuvring space of 1 500 mm diameter allows a wheelchair user to turn and to return to the accessible route. Increasing this to 2 200 mm by 2 100 mm allows for larger wheelchairs or mobility scooters and also for persons with a projecting stiff leg. Increased space to be provided where several people congregate.

c) Where people may need time to read an information or functional sign, a similar space to 6.6.3 b).

d) A signage strategy to specify a logical sequence of directional signs.

e) See EN 17210, no applicable technical specification.

6.6.4 Placement of signs in the outdoor environment

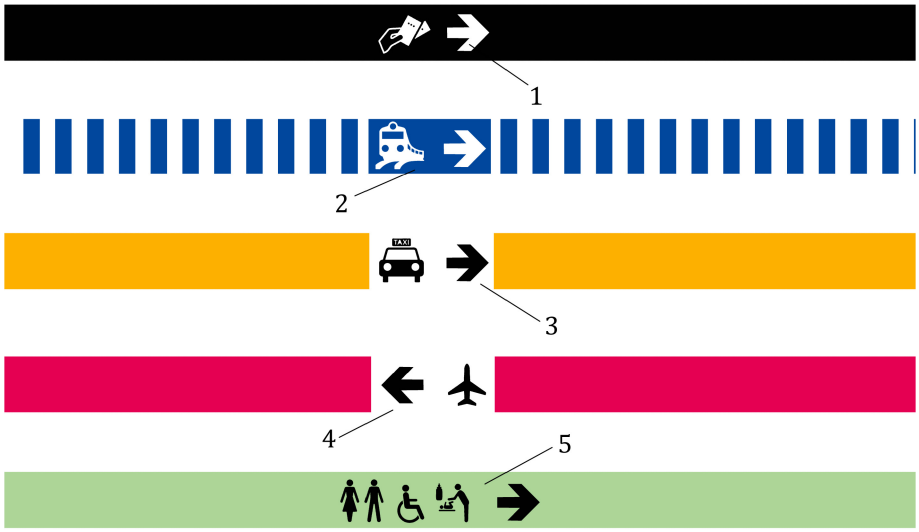
a) to e) See EN 17210, no applicable technical specification.

f) See 7.2 Street furniture.

g) Fixed element for white cane detection at a height of 100 mm from the ground surface extending between the poles, with a visual contrast $C_M \geq 60$ %, and *LRV* of the lighter surface ≥ 50 points (*LRV* difference ≥ 60 points) from the element to the background. The poles also clearly marked with visual indicators which contrast with the pole and background with a visual contrast $C_M \geq 60$ % with *LRV* of the lighter surface ≥ 50 points (*LRV* difference ≥ 60 points). Two-tone contrast bands preferred, see 6.3.5.2 a). See also 7.2 Street furniture.

See also Figure 12 and Figure 13.

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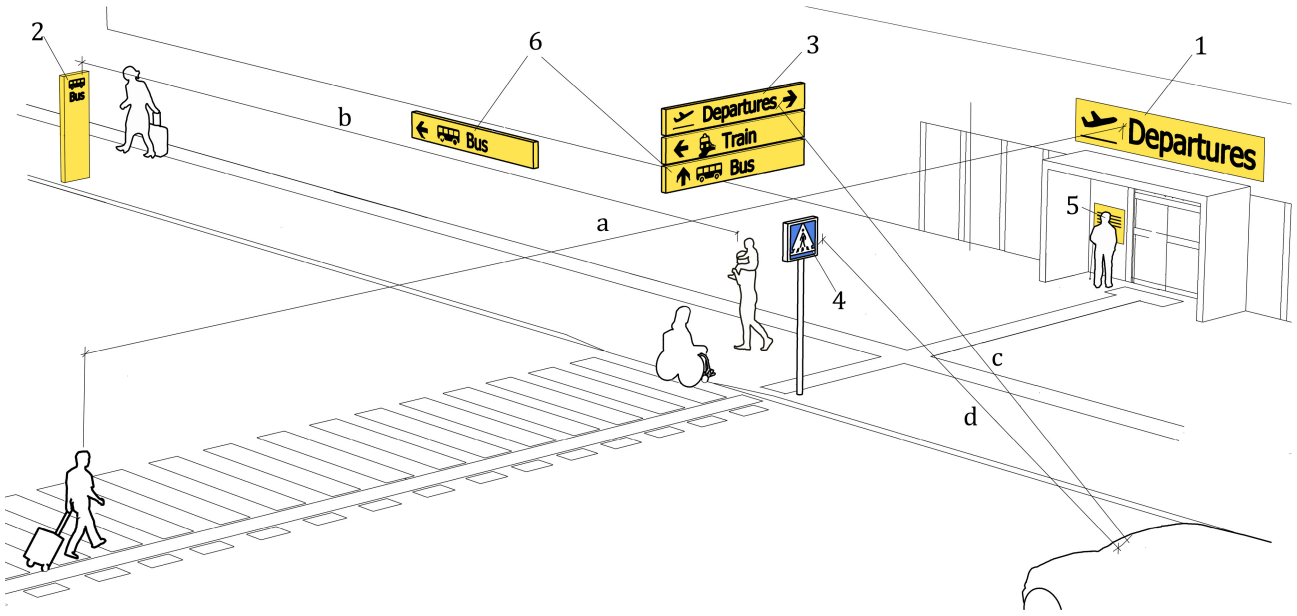


Key

1 white pictogram on black background, approximate visual contrast C_M = 85 %
2 white pictogram on dark blue background, approximate visual contrast C_M =70 %
3 black on orange visual contrast too low, black pictogram on white background chosen
4 black on red visual contrast too low, black pictogram on white background chosen
5 black pictogram on light green background, approximate visual contrast C_M =85 %

Figure 12 — Examples of signage using pictograms with high visual contrast to background

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Key

1 high visual contrast fonts and pictogram of height 20 mm to 30 mm for each meter reading distance
2 low level sign highlighted by visual and ground surface contrast
3 signage with one single message per sign
4 street sign with internationally recognizable pictogram
5 signage for reading close-up adjacent to main accessible route
6 signage readable from different directions
a reading distance for pedestrian crossing street
b reading distance for pedestrian looking for bus stop
c reading distance for persons approaching by car
d reading distance for pedestrian crossing sign

Figure 13 — Examples of signage visible from pedestrian and vehicular routes

6.6.5 Placement of signs in buildings

a) See EN 17210, no applicable technical specification.

b) Door information signs at a height of between 1 200 mm and 1 600 mm from the floor or ground surface, within 50 mm to 100 mm of the door architrave on the latch side.

c) and d) See EN 17210, no applicable technical specification.

e) See 10.3 Handrails for provision of information on handrails.

6.6.6 Height of signs

a) Signs at a height between 1 200 mm and 1 600 mm from the floor or ground surface.

b) Signs also at a height of at least 2 100 mm, preferred minimum height 2 200 mm (NS 11001-1:2018, 12.2), above the floor, where it is likely that the sign may be obstructed, as in a crowded situation, or for signs fixed to the ceiling or projecting from walls. This is in addition to signs between 1 200 mm and 1 600 mm from the floor or ground surface.

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c) Signs with raised tactile and Braille information at a height of between 1 200 mm and 1 600 mm. Signs with tactile information placed at a lower height should be mounted at an angle from the horizontal (preferably 20 ° to 30 °, max. 45 °).

See also Figure 14.

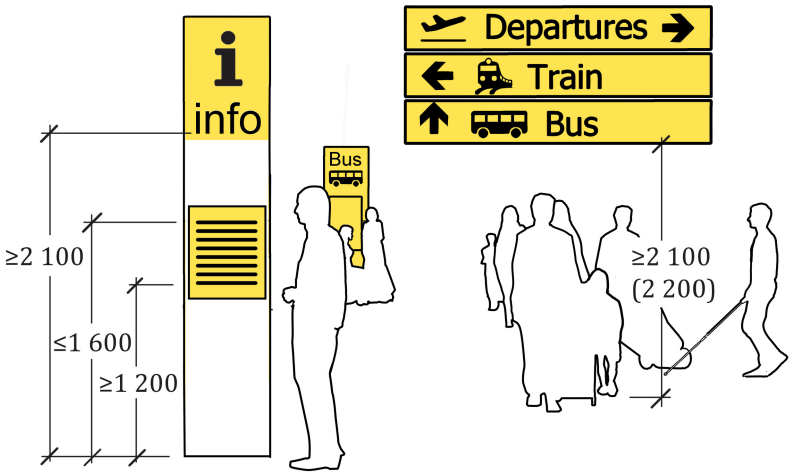


Figure 14 — Example of signage placed at two heights

6.6.7 Font and size of lettering

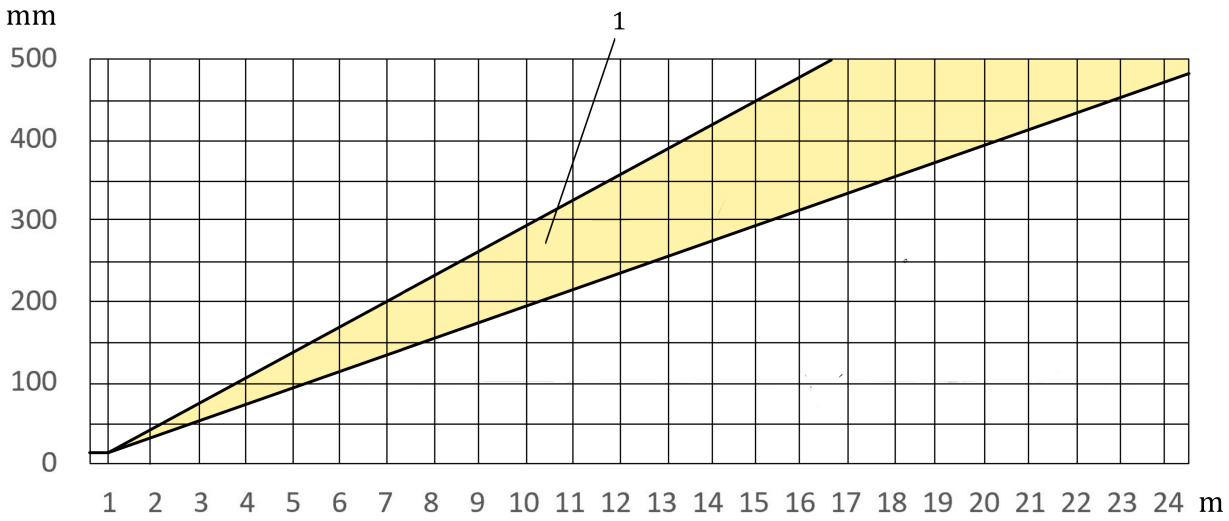
a) A font style that is a sans serif font like Helvetica or Arial medium. Font with clearly recognizable ascenders and descenders, for instance on a Roman script the descender to be 20 % of the upper-case character height (EN 16584-2).

Letter height a minimum of 15 mm, increasing in height with viewing distance, height between 20 mm and 30 mm for each metre of viewing distance. See Figure 15.

b) to e) See EN 17210, no applicable technical specification.

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Key

1 preferred letter height 20 mm to 30 mm for each meter reading distance

Figure 15 — Example of preferred font sizes relative to viewing distances

6.6.8 Visual contrast in signs

a) Visual contrast between the text, pictograms and symbols and the signboard, control or button on a panel with a visual contrast $C_M \geq 60\ \%$ / $C_W \geq 75\ \%$ (*LRV* difference ≥ 60 points), with *LRV* of the lighter surface ≥ 70 points. Between the signboard or panel and the background a visual contrast $C_M \geq 30\ \%$ / $C_W \geq 45\ \%$ (*LRV* difference ≥ 30 points), with *LRV* of the lighter surface ≥ 40 points. Where there is not sufficient contrast between the signboard and the background a visually contrasting border can be effective, a visual contrast $C_M \geq 30\ \%$ / $C_W \geq 45\ \%$ (*LRV* difference ≥ 30 points) between the border and the signboard or panel, with *LRV* of the lighter surface ≥ 40 points.

b) See EN 17210, no applicable technical specification.

6.6.9 Illumination of signs

a) The signboard, text, graphical symbols, logos and other features with a matte or low sheen finish, and the sign placed so it is not in direct sunlight and with no spotlight shining on it.

b) and c) See EN 17210, no applicable technical specification.

6.6.10 Sign content

a) to c) See EN 17210, no applicable technical specification.

6.6.11 Provision of raised tactile and Braille signs

a) See EN 17210, no applicable technical specification

b) Braille and tactile signs placed at a height between 1 200 mm and 1 600 mm. Signs with tactile information placed at a lower height mounted at an angle from the horizontal (preferably 20 ° to 30 °, max. 45 °).

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c) Tactile letters, figures, signs and graphical symbols with a height between 15 mm and 55 mm. Tactile relief of 0,8 mm; between 1 mm and 1,5 mm is preferred. The profile of the relief should be shaped as a rounded upside-down turned letter V.

d) Tactile letters, figures and symbols visually contrasting with the sign with a visual contrast $C_M \geq 60$ % / $C_W \geq 75$ % (*LRV* difference ≥ 60 points), with *LRV* of the lighter surface ≥ 70 points.

e) Braille located 8 mm below the bottom line of the text and left justified. On signs with multiple lines of text and characters, a semi-circular Braille locator on the left margin horizontally aligned with the first line of Braille text.

f) Braille specification for a particular country available from the national organisation representing blind persons and persons with low vision, or from the EBU (European Blind Union).

See also Figure 51.

6.6.12 Information displays

a) See 6.6.6 Height of signs and displays.

b) to g) See EN 17210, no applicable technical specification.

See also 13.2 Public ICT information screens.

6.7 Graphical symbols

6.7.1 Rationale

See EN 17210, no applicable technical specification.

The functional requirements and recommendations in EN 17210 can be achieved by providing:

6.7.2 General

See EN 17210, no applicable technical specification.

Internationally recognised symbols see ISO 7000, ISO 7001 and ISO 7010.

6.7.3 Design

a) See 6.6.8 Visual contrast in signs.

b) Symbols with a matte or low sheen finish, and the sign containing graphical symbols placed so it is not in direct sunlight, if possible, and with no spotlight shining on it.

c) See EN 17210, no applicable technical specification.

d) The size of graphical symbols is dependent on the viewing distance (*D*). The minimum size of the inner outline of the frame of graphical symbols (*s*) can be derived from formula $s = 0{,}09\ D$, applicable for a viewing distance of 1 000 mm to 10 000 mm.

e) See ISO 7000, ISO 7001 and ISO 7010.

f) Tactile symbols consistent with 6.6.11 Provision of raised tactile and Braille signs on directional and door signs.

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7 Access in the outdoor environment

7.1 Accessible routes

7.1.1 Rationale

See EN 17210, no applicable technical specification.

The functional requirements and recommendations in EN 17210 can be achieved by providing:

7.1.2 General

a) Routes that are direct, in a legible framework, with straight lines and preferably with 90 ° turns at junctions with other routes and adjacent areas (BS 8300-1:2018, 5.2.2).

b) See EN 17210, no applicable technical specification.

c) See 7.1.3 Signage, orientation and wayfinding to 7.1.17 Natural trails.

d) See 7.1.3 Signage, orientation and wayfinding and 6.6 Signage.

e) See 7.1.12 Guarding along accessible routes, 6.3 Visual contrast, 6.4 Tactile information and 7.3 Pedestrian crossings.

7.1.3 Signage, orientation and wayfinding

a) Signage easy to read and understandable according to the multiple-sense principle, with raised tactile fonts and Braille where appropriate:

   — orientation signs such as sketches, plans, models, etc.;

   — directional signs: directional information from point A to B;

   — functional signs: explanatory information;

   — informative signs: purely informative, for example a name;

   — signs for emergency exits.

   Graphical symbols (pictograms and icons) which are internationally recognised and universally accepted, in conjunction with signage wherever possible, particularly where signage is in another language.

   See 6 Wayfinding (6.1 Wayfinding, orientation and navigation, 6.2 Wayfinding information, 6.3 Visual contrast, 6.4 Tactile information, 6.5 Audible information and hearing enhancement, 6.6 Signage, 6.7 Graphical symbols).

b) See 7.1.3 a).

c) See 6.6.4 Placement of signs in the outdoor environment and 6.6.5 Placement of signs in buildings.

d) See 6.6.9 Illumination of signs and 15.1 Lighting.

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7.1.4 Step-free accessible routes

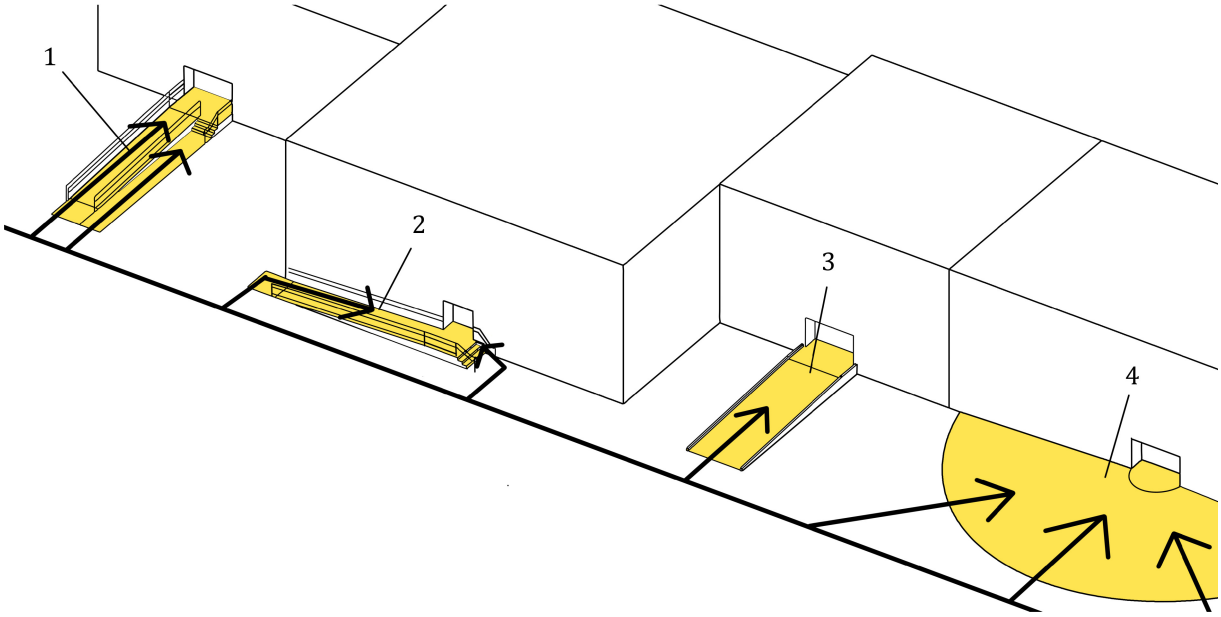
a) Routes free of steps and level or with a maximum gradient of 4 % or 5 % according to prevailing regulations or standards.

b) Any parts of the route which have a gradient greater than 4 % or 5 % according to prevailing regulations or standards, designed as ramps. See also 10.1 Ramps.

c) No change in level where routes intersect.

d) A flight of steps (3 steps or more) in addition to a ramp, if the ramp is steeper than 1:20 (5 %) and the change in level is more than 300 mm.

See also Figure 16.



Key

1 ramp along with a flight of steps as accessible route
2 ramp and opposing flight of steps as accessible route
3 sloping path as step-free accessible route. See 10.1.4 Gradient and length of a sloping path and a ramp.
4 sloping terrain with a gradient less than 4 % or 5 % (according to prevailing regulations or standards) for step-free access from multiple directions

Figure 16 — Examples of step-free accessible routes

7.1.5 Surface of accessible routes

a) Level and flat surfaces, with no variation of surface or irregularities more than 5 mm, at any given point in the walking surface, between paving, surface features and mix of different surfaces; materials such as cobbles, unbonded gravel and lose bare earth are not suitable for even surfaces. Maximum cross-fall gradient 1:50 (2 %).

b) Surfaces which resist movement and deformation by applied forces; avoid loose materials such as unbonded gravel, wood chips, or sand; provide hardened materials such as concrete, asphalt, tiles, paving stones and wood.

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NOTE Some natural surfaces, such as compacted earth, soil treated with consolidation, or materials stabilized and retained by permanent or temporary geotextiles, grid forms, or similar construction can perform satisfactorily for persons using wheelchairs and walking aids (United State Access Board Guide, chapter 3, United State Access Board Technical Bulletin:2005, Ground and Floor Surfaces).

c) Surface finish that is sufficiently rough or otherwise specially formulated so that friction between the surface and a person's footwear or mobility aid is maintained at an acceptable level in both wet and dry conditions. Assessment according to national or International standards. (EN 16584-3:2017, 5.2.2 and prEN 16165:2020). The Pendulum Test Value (PTV) of outdoor surface finishes, more than 45, tested according to the method described in prEN 16165:2020, Annex C).

d) Assessed gloss value of maximum 50, in accordance with EN ISO 2813 for paints and varnishes. For other ground material and/or surface materials, assessment not necessary. (EN 16587:2017, 5.2.1).

e) Assessment according to national or International standards.

f) Continuous, uniform surface with no irregularities.

g) Maximum width of joints which are filled and recessed below the surface 10 mm, with a maximum difference in level between adjacent units 2 mm and maximum recess 5 mm; maximum width of unfilled joints 5 mm with a maximum difference in level between adjacent units 2 mm; maximum height variation of undulations between adjacent paving elements 3 mm under straight edge. (BS 8300-1:2018, 8.4.1).)

h) See 6.1 Wayfinding, orientation and navigation and 6.3 Visual contrast.

i) See EN 17210, no applicable technical specification.

See also 9.6 Surface finishes and materials.

7.1.6 Width of accessible routes

a) The minimum width of the route is determined by expected level/frequency of use of the route. See Table 1.

Table 1 — Examples of minimum widths of accessible routes

Example application	**Minimum unobstructed surface width** [mm]
Accessible route for constant two-way traffic (permitting two persons using a wheelchair or other wheeled mobility device or walking aid to pass each other)	1 800 2 000 preferred to accommodate larger electric mobility scooters (BS 8300 1:2018, 8.1.2)
Accessible route for frequent two-way traffic (permitting a walking person and a person using a wheelchair or other wheeled mobility device or walking aid or white cane to pass each other)	1 500
Accessible route for infrequent two-way traffic	1 200
All obstacle-free routes, footbridges and subways, except in doors, platforms and crossings.	1 600 (EN 16587:2017, 5.2.2)
Accessible route where passenger flows, sports facilities and events where crowds are expected	As required by relevant guidelines or national regulations

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See also 7.1.7 Passing place for users of wheeled mobility devices.

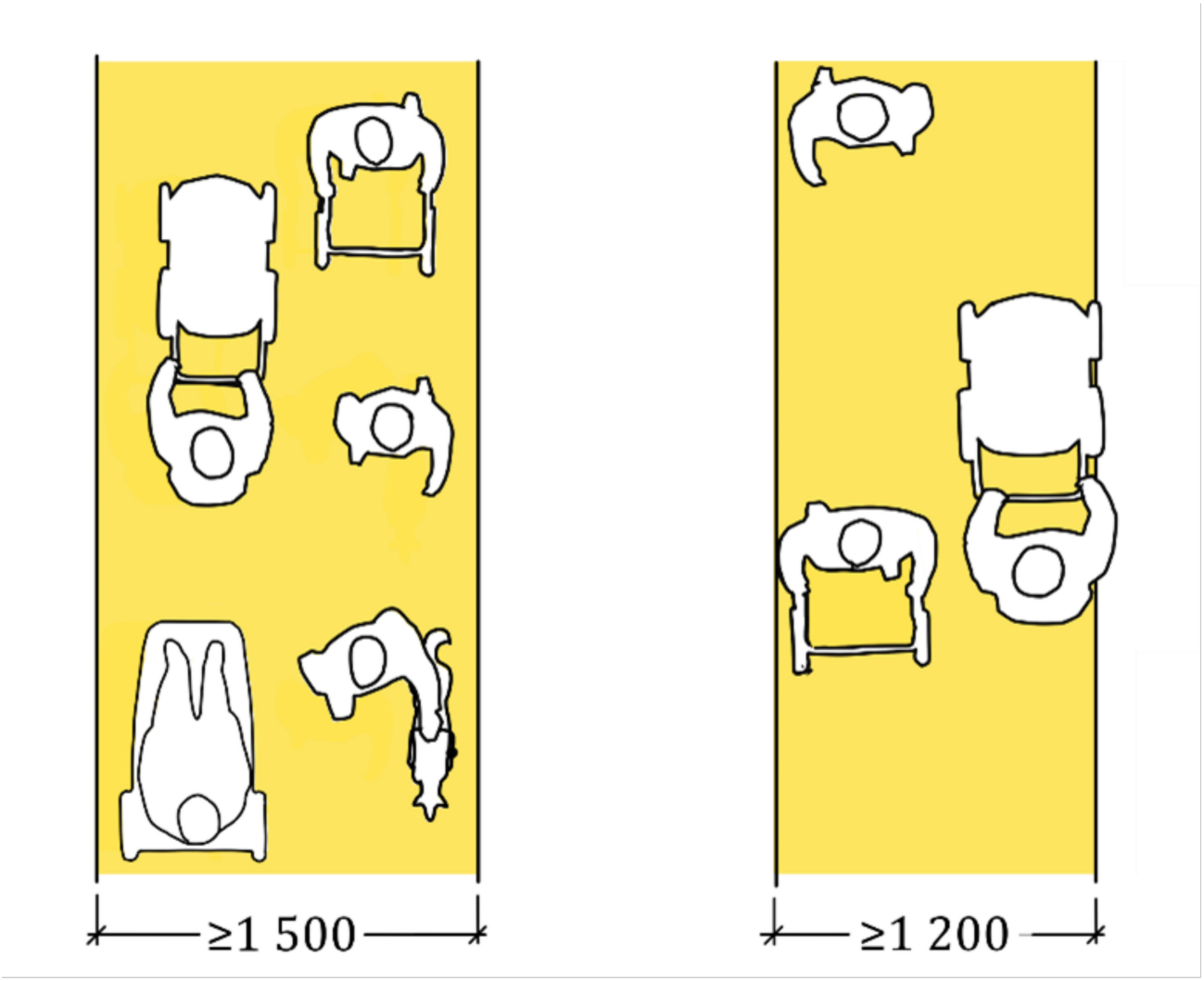
b) See 7.1.6 a).

c) Route free of obstacles, such as projecting signs or objects mounted on walls, bollards, columns or free-standing supports along the unobstructed width of the route. See 7.1.15 Obstacles on an accessible route.

   Handrails may not encroach into the unobstructed width of the route (EN 16587:2017, 5.2.2).

d) See 7.1.15 Obstacles on an accessible route.

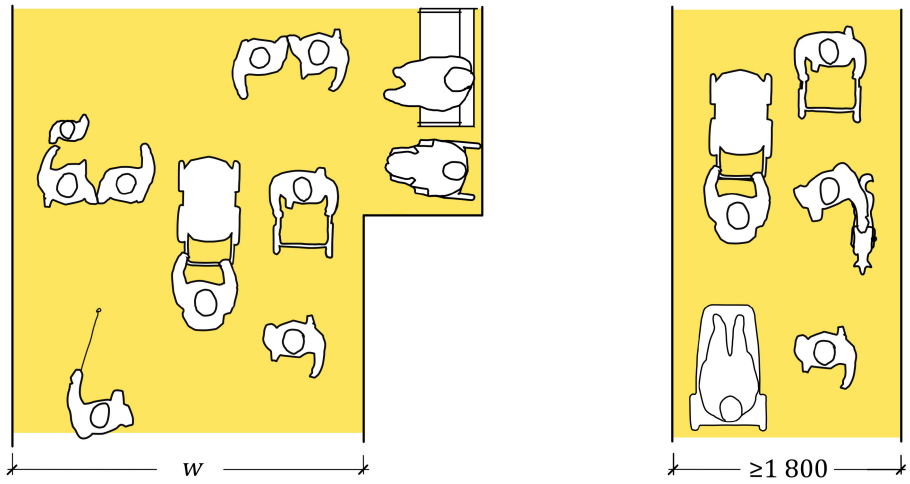
e) Occasional narrowing of the accessible route, when unavoidable, with restricted width of minimum 1 200 mm and extending maximum 2 000 mm in length (BS 8300-1:2018, 8.1.3). See also Figure 17 and Figure 18.



a) Frequent two-way traffic **b) Infrequent two-way traffic**

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c) Where crowds are expected **d) Constant two-way traffic**

Key

w width accommodating crowds or larger passenger flows

Figure 17 — Example widths of accessible routes

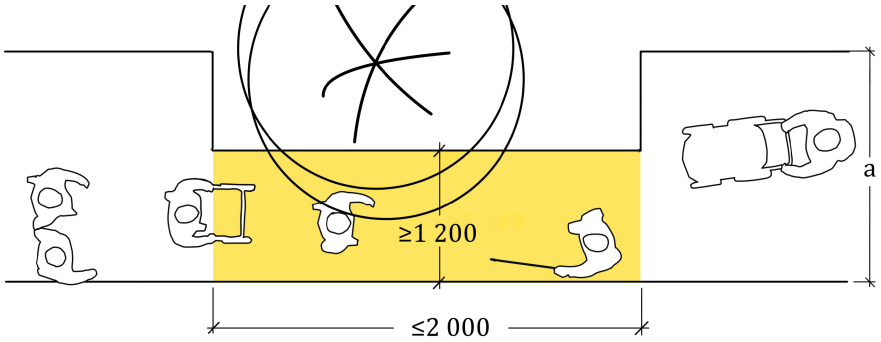


Figure 18 — Example dimensions of occasional narrowing of accessible route

7.1.7 Passing place for users of wheeled mobility devices

Passing places of 1 800 mm x 2 000 mm for persons using wheeled mobility devices at intervals of maximum 25 m and with clear line of sight in both directions along the route. See also Figure 19.

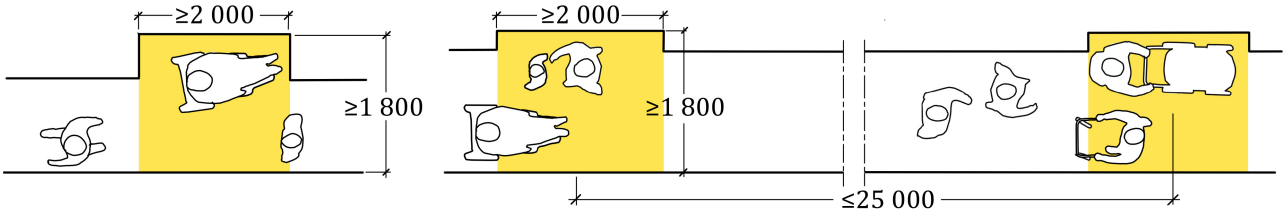


Figure 19 — Examples dimensions of passing places for persons using wheeled mobility devices

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7.1.8 Turning space for users of wheeled mobility devices

For changes of direction of more than 45°, minimum unobstructed manoeuvring/turning space of 1 500 mm × 1 500 mm for manual wheelchairs; for larger powered wheelchairs and scooters for outdoor use, minimum radius of the outer turning circle 2 000 mm.

See also 9.2 Corridors and passageways and ISO 21542:2011, Annex B, B.6 General design considerations for wheelchair users.

7.1.9 Drainage of accessible routes

a) Maximum cross-fall gradient 1:50 (2 %).

b) Drainage grating within the boundaries of the route, level with the surface; maximum height variation 5 mm.

c) Dished channels with maximum width of 150 mm and a maximum drop into gulley of 5 mm. Grating slots with maximum width of 13 mm wide; circular holes in gratings with a diameter of maximum 18 mm (BS 8300-1:2018, 8.2.1.5).

d) to f) See EN 17210, no applicable technical specification.

g) Heated surfaces, such as embedded heating systems, where necessary, in places with extreme cold and icy conditions.

h) and g) See EN 17210, no applicable technical specification.

7.1.10 Headroom on accessible routes

Minimum headroom of 2 100 mm, preferred headroom 2 250 mm (NS 11001-1:2018.6.2) above the floor or ground surface, throughout the entire width of the route. See also 7.1.15 Obstacles on an accessible route. See also Figure 20 and Figure 22.

7.1.11 Handrails for support and guidance

a) Handrails on both sides of stepped routes. See also 10.3 Handrails.

b) Handrails, preferably at two heights, depending on the type of the facility and according to the specific use of the building, such as in health centres, nursing homes and outdoor routes in nature areas.

7.1.12 Guarding along accessible routes

a) An upstand of minimum height of 150 mm at the relevant side or sides of the route when the difference in level is maximum 600 mm or guarding of minimum height of 1 000 mm above the surface of the route, when the difference in level is greater than 600 mm; visual contrast to the background with a visual contrast $C_M \geq 30$ % (*LRV* difference ≥ 30 points), with *LRV* of the lighter surface ≥ 40 points. See also 6.3 Visual contrast.

b) Level margin of minimum width 600 mm for maximum downwards slope 1:3 (33,3 %).

c) Guardrails or barriers with a visual contrast $C_M \geq 30$ % (*LRV* difference ≥ 30 points) to the background, with *LRV* of the lighter surface ≥ 40 points. See also 6.3 Visual contrast.

d) Guarding designed without single horizontal rails which may be used as supports for climbing, apart from the provision of handrails.

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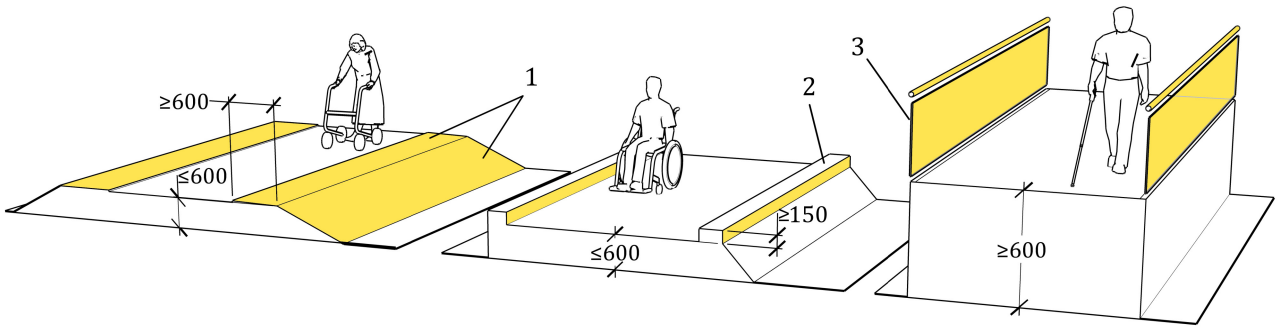
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e) Guarding that may be used by children under five years of age, a maximum 100 mm opening/sphere between the rails/wire. Alternative options include safety glass panels or perforated metal panels. Assessment according to EN 1176-1:2017, D.2 Head and neck entrapment.

f) A warning guardrail or other barrier, at a minimum height 100 mm, maximum height 300 mm, above the floor or ground level, when the clear height beneath the soffit is less than 2 100 mm, preferred 2 200 mm (NS 11001-1:2018, 6.5, 6.6 and 9.3.1). See Figure 26 and also 7.1.15 Obstacles on an accessible route.

g) Guarding with minimum transparent section provided at a height between 800 mm and 1 200 mm; minimum height of the lower edge above the floor or ground surface 100 mm.

See also Figure 20, Figure 21 and Figure 22.



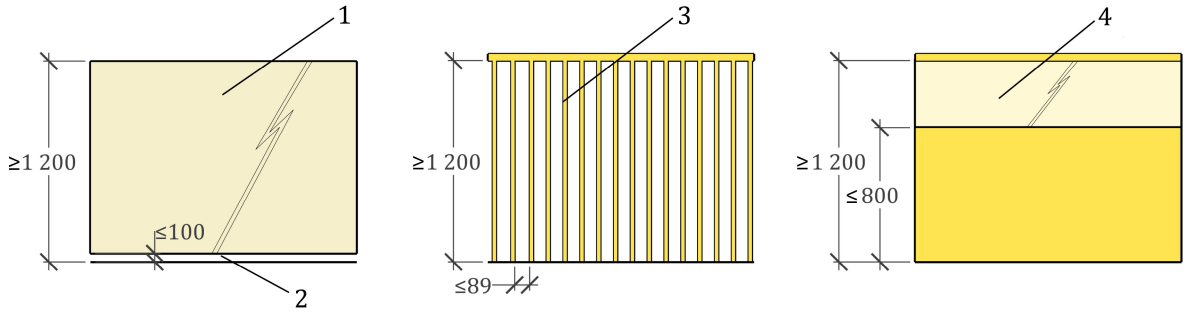
Key

1 level margin minimum 600 mm to sides of path and downwards slope maximum 1:3 (33,3 %), path raised maximum 600 mm above surrounding terrain

2 upstand minimum 150 mm to sides when path raised maximum 600 mm above surrounding terrain

3 guardrails to sides of path when path raised more than 600 mm above surrounding terrain

Figure 20 — Example of guarding along accessible routes



Key

1 full height transparent guarding

2 lower edge maximum 100 mm above ground surface

3 vertical balusters to avoid climbing, spacing maximum 89 mm to avoid head and neck entrapment (EN 1176-1:2017, Annex D.2)

4 transparent part of guarding minimum between 800 mm and 1 200 mm above ground surface

Figure 21 — Example dimensions of guarding geometry

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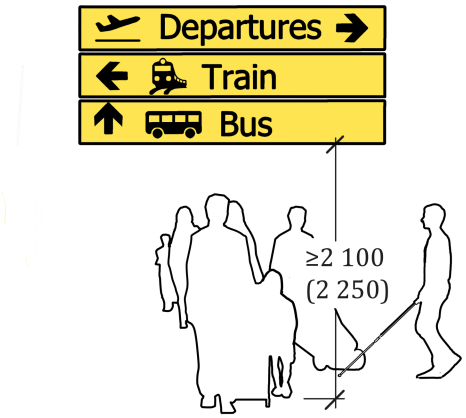


Figure 22 — Example dimensions of headroom

7.1.13 Visual contrast on accessible routes

a) Visual contrast between the surface of the accessible route and adjacent surfaces at the same level, where feasible, with a visual contrast C_M ≥ 30 % (*LRV* difference ≥ 30 points), with *LRV* of the lighter surface ≥ 40 points. See 6.3 Visual contrast.

b) See 10.1.3 Approaches to ramps and 10.2.7 Visual and tactile warnings.

c) See 6.3 Visual contrast and 6.6 Signage.

7.1.14 Lighting on accessible routes

a) A minimum light level provided according to the visual task. See Table 2.

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Table 2 — Examples of minimum light level in different areas

Example application	Minimum light level [lux]
Outdoor environments[a] (walkways for pedestrians)	20
Horizontal surfaces indoors[b]	100
At changes in level (approaches of stairs, ramps, escalators, moving walks)*[b]	150 to 200
[a] See also general lighting requirements of outdoor working spaces in EN 12464-2 with no specific consideration of persons with vision impairments, therefore these minimum lighting levels are higher. [b] See also general lighting requirements of indoor working spaces in EN 12464-1 with no specific consideration of persons with vision impairments, therefore these minimum lighting levels are higher.	

See also 15.1 Lighting.

b) Maximum Unified Glare Rate (UGR): Generally, 25 for circulation areas and 22 for habitable rooms.

NOTE Concerning general UGR lighting requirements for different indoor working places see EN 12464-1; for outdoor working places see EN 12464-2. For persons with vision impairments these general UGR lighting requirements may be increased for their specific working places with additional adjustable desk lamps until doubled UGR lighting requirements (ÖNORM B 1600:2017, 8.2).

Glare and shadows can be avoided by:

— shielding or shading light sources;

— use of indirect lighting;

— locating appropriately the light source in relation to the direction of vision and to the object to be observed;

— avoiding the use of uplighters with light sources at floor or low level;

— avoiding windows at the end of corridors; or using shutters, blinds and/or curtains to filter excessive sunlight coming through windows.

— choosing light colours for ceilings or walls;

c) avoiding abrupt transitions from light to dark space. See also 15.1 Lighting and EN 12464-1 and -2 according recommended transition values.

d) Additional lighting at the approaches of stairs, ramps, escalators, moving walks, at junctions and at points where visual information is placed. See Table 2 and 15.1 Lighting.

7.1.15 Obstacles on an accessible route

a) Accessible routes free of objects standing within or projecting more than 100 mm into the route between 300 mm and 2 100 mm, preferred 2 250 mm (NS 11001-1:2018, 6.2), above the floor or ground surface. See also EN 17210.

b) Minimum headroom for overhanging objects, including tree branches, hanging baskets for floral displays or signage, 2 100 mm, preferred headroom 2 250 mm (NS 11001-1:2018, 6.2), above the floor or ground surface, throughout the entire width of the route. See also 7.1.10.

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c) Objects with a visual contrast $C_M \geq 30$ % (*LRV* difference ≥ 30 points) to the background against which they are seen, with *LRV* of the lighter surface ≥ 40 points; free-standing objects clearly marked with visual indicators of a minimum height of 75 mm and placed at a height between 900 mm to 1 000 mm and 1 500 mm to 1 600 mm on the objects. Visual indicators consisting of two separate colours, or two shades of the same colour, with a visual contrast $C_M \geq 60\%$ / $C_W \geq 75\%$, with LRV of the lighter surface ≥ 50 points (*LRV* difference ≥ 60 points), enable lighting conditions and backgrounds from either side to be taken into account See also 6.3 Visual contrast.

d) A protective guard such as a plinth, kerb or tapping rail, placed under any object projecting into the route at a height greater than 100 mm:

— protective plinth, kerb or similar barrier at a height of minimum 100 mm and set back maximum 100 mm from the face of the projecting object;

— tapping rail with its underside at a maximum height of 100 mm above ground level; or

— winged protection like wing walls or side partitions, in case free space is needed beneath the object, with the bottom edge no higher than 300 mm above the ground or floor surface and extending continuously up to 1 000 mm above the ground or floor surface;

— winged protection with a visual contrast $C_M \geq 30$ % (*LRV* difference ≥ 30 points) to the background, with *LRV* of the lighter surface ≥ 40 points.

— see also 7.1.12 Guarding along accessible routes.

e) See EN 17210, no applicable technical specification.

f) See 6.3.5 Visual indicators on glazing.

g) See 7.2.8 Bollards

h) Alcoves or recessed areas, outside the required width of the route, where possible, for placing objects which are necessary.

See also Figure 23.

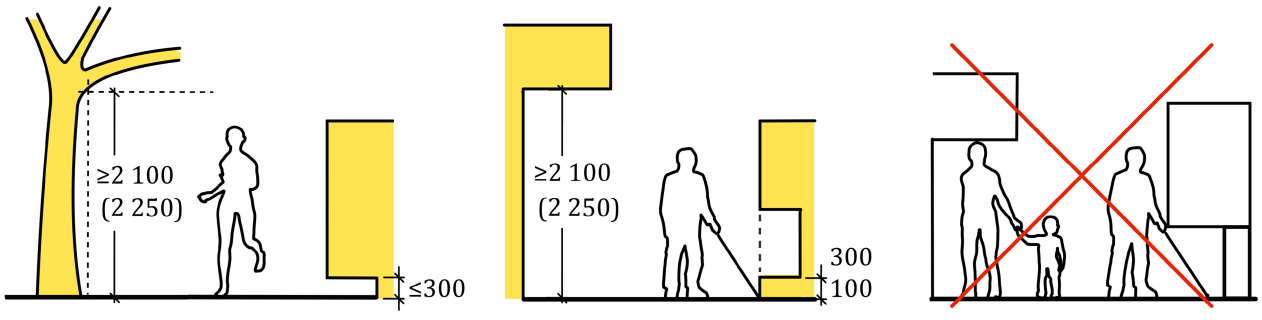


Figure 23 — Example dimensions of headroom and protective guarding

7.1.16 Resting places on accessible routes

a) Accessible seating at intervals of a maximum distance of 50 m, where required in indoor and outdoor areas, such as transport terminals, healthcare buildings, places for administrative management,

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queuing areas, long distance routes, parks, etc. (BS 8300-1:2018, 8.1). See 11.3 Seating and resting areas.

b) to e) See 11.3 Seating and resting areas.

7.1.17 Nature trails

a) Signs including the International Symbol of Accessibility (ISA), placed at the start of the path or trail and at junctions, to indicate accessible paths and trails and/or accessible itineraries within a trail.

b) Accessible routes following 7.1 to 7.16 where achievable in the given topographic conditions.

c) See 6.6 Signage.

See also Figure 24.

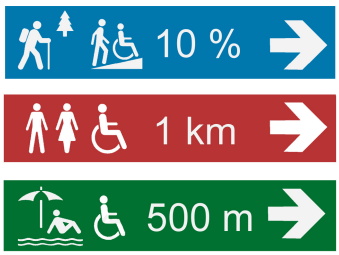


Figure 24 — Example nature trail signage on gradients, accessible toilet and beach facilities

7.2 Street furniture

7.2.1 Rationale

See EN 17210, no applicable technical specification.

The functional requirements and recommendations in EN 17210 can be achieved by providing:

7.2.2 General

a) See 7.1.6 Width of the accessible route.

b) See 11.3 Seating and resting areas, 7.2.6 Bus stops and 0 Bus and coach stops, and 6.6 Signage.

c) Items such as bollards, bins and planters a minimum height of 1 000 mm with the same width at the bottom as the top or tapered towards the top but not tapering towards the ground, or a form of ground level detection, plinth or tapping rail detectable with a white cane, at a height of 100 mm from the ground. No links between bollards. If there are items less than 1 000 mm high, these should have a greater diameter, at 500 mm height a diameter of 300 mm minimum, for a 1 000 mm post, the diameter will be 120 mm minimum. See 7.2.5 for visual contrast.

NOTE Objects with a height lower than 1 000 mm are a hazard for blind or partially sighted persons and can cause injury.

d) and e) See EN 17210, no applicable technical specification.

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7.2.3 Provision

Regular checks to ensure an adequate number of benches, streetlamps, litter bins or other street furniture and any excess removed.

7.2.4 Location

a) Recessed areas for seating (see 11.3 Seating and resting area), and for location plans or information signs to allow for people to stop and look at these (see 6.6.3 Placement of signs).

b) See EN 17210, no applicable technical specification.

c) Street furniture zones leaving adequate unobstructed space alongside for accessible routes (see 7.1.6 Width of the accessible route). Individual items of street furniture in a zone positioned an equal distance apart with the effective clear width between items of street furniture not less than 1 200 mm.

7.2.5 Contrast

a) Street furniture contrasting visually with the background against which they are seen with a visual contrast $C_M \geq 30$ % (*LRV* difference ≥ 30 points), with *LRV* of the lighter surface ≥ 40 points. See also 6.3 Visual contrast.

b) Visually contrasting bands on unexpected obstacles such as litter bins. Visual contrast band consisting of two separate colours, or two shades of the same colour, with a visual contrast $C_M \geq 60\%$ / $C_W \geq 75\%$, and LRV of the lighter surface ≥ 50 points, (*LRV* difference ≥ 60 points) enable lighting conditions and backgrounds from either side to be taken into account. The contrasting band to be of a minimum height of 75 mm and placed at a height between 900 mm to 1 000 mm. Low bollards and other items with a height of, or less than, 1 000 mm high to incorporate a 150 mm deep contrasting strip at the top.

c) Visually contrasting bands $C_M \geq 60$ % (LRV difference ≥ 60 points) on tall items such as lighting columns placed in two bands at a height between 900 mm to 1 000 mm and 1 500 mm to 1 600 mm.

d) A matte, not gloss, finish on street furniture items.

e) See EN 17210, no applicable technical specification.

7.2.6 Bus stops

The following requirements and recommendations apply:

a) See EN 17210, no applicable technical specification.

b) An unobstructed boarding area at the bus stop of 2 000 mm × 2 000 mm (BS 8300-1: 2018, 6.2.2). A guidance TWSI may be located from the building line to the boarding point or bus stop pole, if determined by national standards. For accessible routes adjacent bus stops see 7.1.6 Width of the accessible route.

c) A footway width of 3 000 mm for bus stops in front of shops, wherever possible. Avoid locating cycle lanes between bus stops/shelters and the edge of the footway so that passengers are able to access buses and bus stops without risking collision with cyclists. Where bus stop islands are required refer to Figure 100.

See also 20.3 Bus and coach facilities.

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7.2.7 Outdoor refreshment areas

a) See EN 17210, no applicable technical specification.

b) Barriers with a plinth or tapping rail at a height of 100 mm from the ground, contrasting visually with the background against which they are seen with a visual contrast $C_M \geq 60$ %, and *LRV* of the lighter surface ≥ 50 points (*LRV* difference ≥ 60 points). See also 6.3 Visual contrast.

c) Gaps in the barriers 1 200 mm wide, minimum width 1 000 mm.

For more information on the design and location of outdoor refreshment areas see 17.8 Restaurants, bars and cafés.

7.2.8 Bollards

a) Regular checks that bollards are only where they are needed for a specific purpose.

b) Height of bollards minimum 1 000 mm.

c) See 7.2.5 Contrast.

d) Bollards equally spaced at 1 200 mm, minimum 1 000 mm.

e) See EN 17210, no applicable technical specification.

f) and g) See 7.2.2 General.

h) and i) See EN 17210, no applicable technical specification.

7.2.9 Perimeter protection

Bollards, planters and other features used to provide perimeter protection positioned with gaps of 1200 mm between them, minimum 1 000 mm. There should be no gaps in protection around hazards such as road works and scaffolding.

7.2.10 Support for orientation and wayfinding

See EN 17210, no applicable technical specification. See 6 Wayfinding and 7.1 Accessible route.

7.3 Pedestrian crossings

7.3.1 Rationale

See EN 17210, no applicable technical specification.

The functional requirements and recommendations in EN 17210 can be achieved by providing:

7.3.2 General types of pedestrian crossings

7.3.2.1 General

See EN 17210, no applicable technical specification.

7.3.2.2 Controlled pedestrian crossings

a) See EN 17210, no applicable technical specification.

b) See EN 17210, no applicable technical specification.

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7.3.2.3 Signal controlled pedestrian crossings

a) Audible, visual and tactile signal:

— audible signal with automatic adjustment of volume to ambient noise;

— visual signal with high contrast to background;

— tactile signal detectable via e.g. vibrating or rotating surface.

b) Activation:

— remote control or automatic activation;

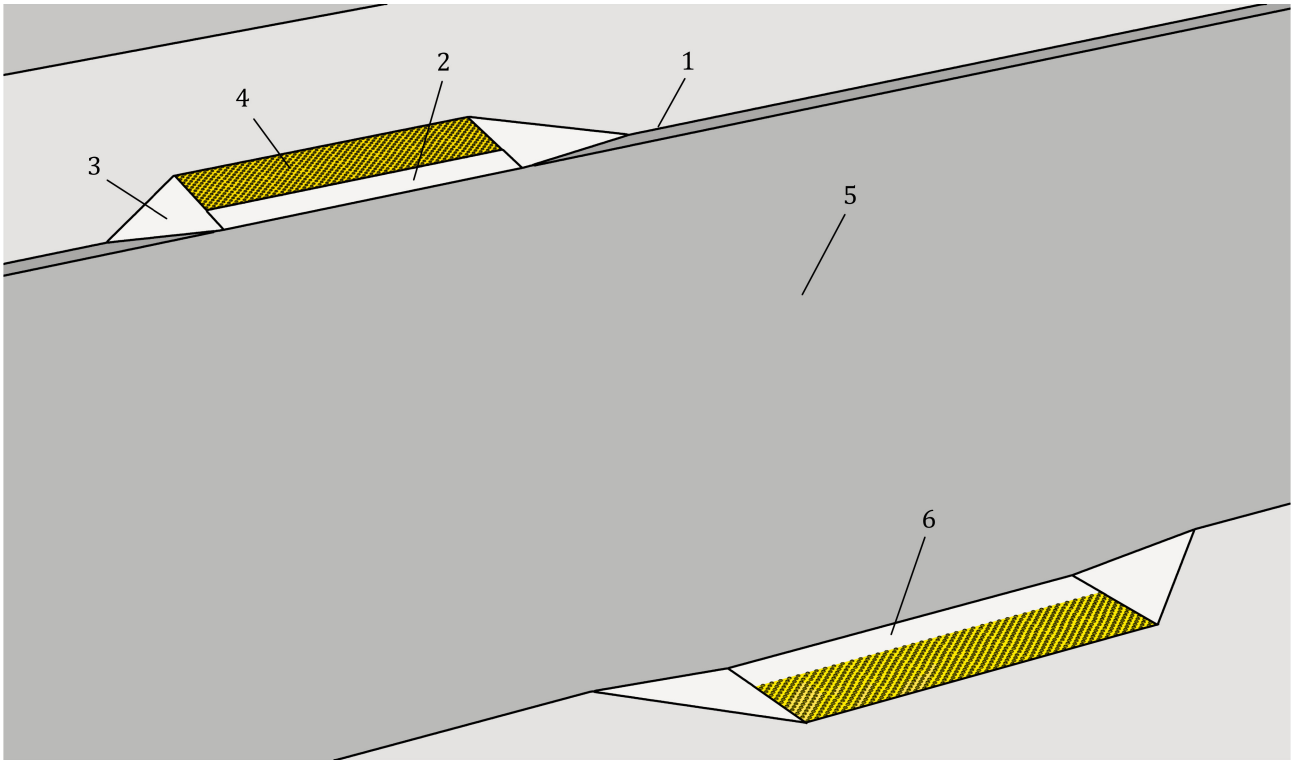
— alternatively, push button activation.

c) Example calculation walking speeds 0,7 m/s (Danish Road Directorate) to 1,0 m/s (Richtlinien für Lichtsignalanlagen, RiLSA:2015) for slow walking at crossings with many elderly persons and children.

7.3.2.4 Uncontrolled pedestrian crossings

a) See example in Figure 25.

b) See EN 17210, no applicable technical specification.



Key

1 kerb
2 kerb ramp with slope 1:8 (12.5 %) to 1:12 (8.3 %)
3 longitudinally sloping side
4 tactile walking surface indicator (ISO 23599)
5 road surface
6 kerb ramp on opposite side of road

Figure 25 — Example of uncontrolled pedestrian crossing with kerb ramps on both sides

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7.3.3 Location and visibility of pedestrian crossings

a) to e) See EN 17210, no applicable technical specification.

7.3.4 Pedestrian crossing width

Decided in consultation with the relevant road authority.

7.3.5 Level access at kerb ramps and raised pedestrian crossings

a) Level access with a kerb ramp or a raised road crossing:

— difference in level at kerb ramp or raised road 0 mm;

NOTE In some countries a difference in level up to 30 mm is used.

— kerb ramp minimum 1 500 mm wide or width determined by national regulations.

b) See EN 17210, no applicable technical specification.

c) See EN 17210 and Figure 26.

d) Tactile means:

— guiding patterns on footway. See in Figure 26;

— tactile guidance across the surface of the road (ÖNORM V 2102:2018, Figure XXX). May require use of e.g. concrete with recessed profile for durability and detectability. See Figure 27.

e) Kerb ramp slopes:

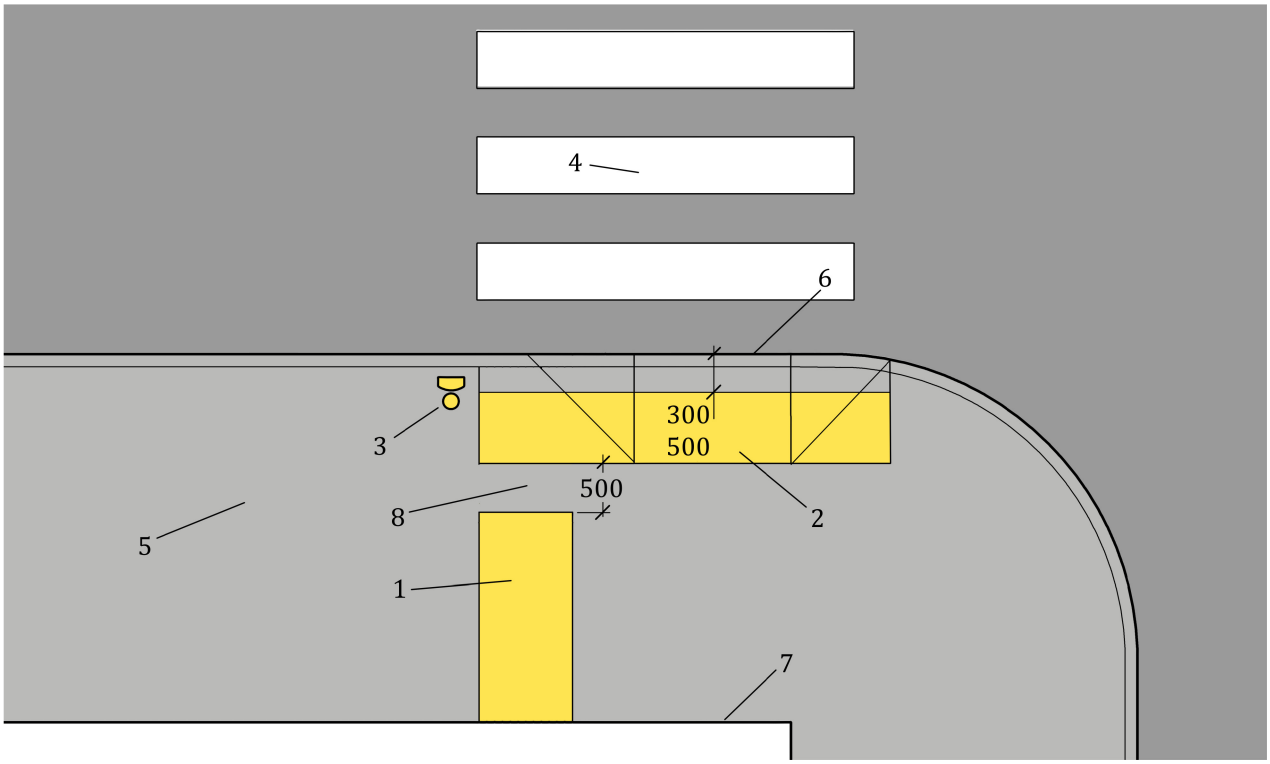
— transversal slope 1:8 (125 mm/m) or less, preferably 1:12 (83 mm/m);

— longitudinal slope 1:8 (125 mm/m) or less, preferably 1:12 (83 mm/m).

f) See ISO 23599 and 6.4 Tactile Information.

g) See ISO 23599, 6.4 Tactile Information and example in Figure 26.

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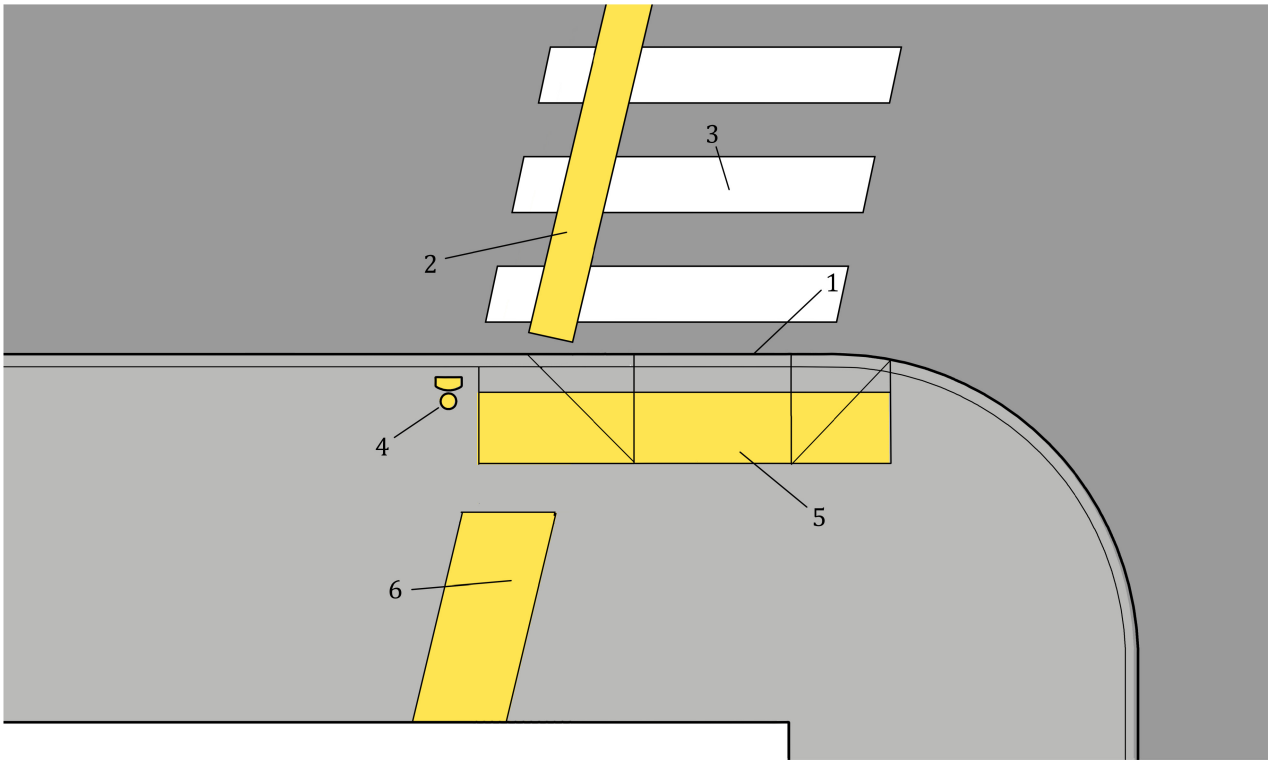


Key

1 TWSI leading to the crossing, extending back to the building line or with minimum distance of 5 000 mm
2 TWSI set-back 300 mm to 500 mm from the edge of the carriageway
3 audible signal activation
4 visually contrasting markings on road surface
5 footway
6 kerb at right angle to the crossing
7 building line
8 TWSI guidance and attention patterns separated 500 mm

Figure 26 — Example layout of TWSIs at pedestrian crossing

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Key

1 kerb

2 tactile guiding pattern across road surface (ÖNORM V 2102:2018, Figure 22)

3 visually contrasting markings on road surface

4 audible signal activation

5 attention pattern on kerb ramp

6 TWSI pattern on footway aligned with direction of crossing

Figure 27 — Example of tactile guidance across road surface when crossing not at a right angle

See also national examples of tactile guidance at pedestrian crossings in ANNEX B.

7.3.6 Raised road pedestrian crossings

a) and b) See EN 17210, no applicable technical specification.

c) Markings according to national regulations.

d) See example in Figure 27.

e) See EN 17210, no applicable technical specification.

7.3.7 Lighting, traffic lights and contrast at pedestrian crossings

a) See 15.1 Lighting and national regulations.

b) Markings with high visual contrast to the road surface. See 6.3 Visual contrast.

c) Tactile means:

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— guiding patterns on footway. See Figure 26;

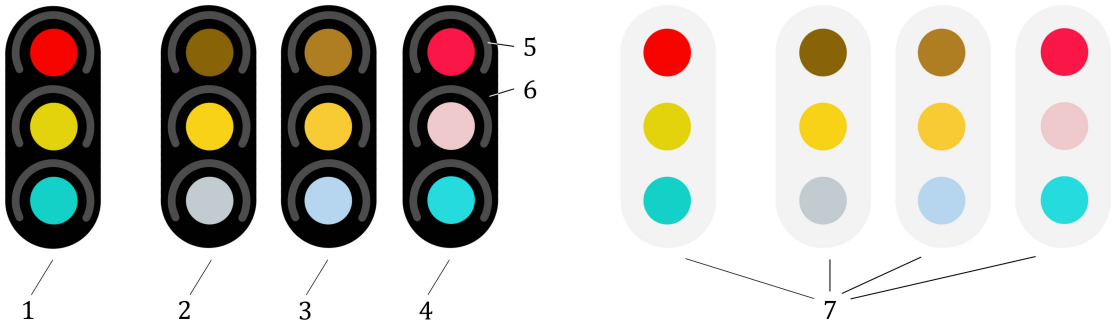
— tactile guidance across the surface of the road, e.g. by use of concrete with wide, embossed patterns for durability and detectability. See Figure 27.

d) Traffic light signals:

— colours red, yellow and green at wavelengths that also assist people with differences in colour perception to tell them apart. See examples in Figure 28.

— recognizable walking and standing person symbols used in traffic lights for pedestrians.

e) Traffic lights positioned on dark background, shielded from direct sunlight. See example in Figure 28.



Key

1 examples of traffic light colours on dark background, as they may appear with normal colour perception (approximated). Green colour often shifted towards blue region of CIE colour space
2 example protanope perception of traffic light colours (approximated)
3 example deuteranope perception of traffic light colours (approximated)
4 example tritanope perception of traffic light colours (approximated)
5 shading against direct sunlight
6 dark contrasting background
7 colours 1 to 4 when seen on light background

Figure 28 — Examples of traffic lights colours on dark and light background

7.3.8 Audible and tactile signals at pedestrian crossings

a) to g) See EN 17210, no applicable technical specification.

NOTE In some countries audible information is provided on the location of the push button.

7.3.9 Surfaces at pedestrian crossings

a) See EN 17210 and 7.1.5 Surface of the accessible route.

b) See EN 17210, no applicable technical specification.

c) See 6.4 Tactile information and ISO 23599.

d) See 7.3.5 Level access at kerb ramps and raised pedestrian crossings.

e) See EN 17210, no applicable technical specification.

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7.3.10 Pedestrian refuge islands

a) See 6.4 Tactile Information, 7.3.5 Level access at kerb ramps and raised pedestrian crossings and 6.3 Visual contrast.

b) to f) See EN 17210, no applicable technical specification.

7.3.11 Drainage

a) and b) See EN 17210, no applicable technical specification.

7.3.12 Guard railing at pedestrian crossings

a) and b) See EN 17210, no applicable technical specification.

7.3.13 Vehicle entry/exit points

a) to d) See EN 17210, no applicable technical specification.

7.4 Squares and plazas

7.4.1 Rationale

See EN 17210, no applicable technical specification.

The functional requirements and recommendations in EN 17210 can be achieved by providing:

7.4.2 General

a) No barriers or obstructions, particularly at main pedestrian entry points. See 7.1 Accessible routes.

b) Protection against vehicular traffic which can be achieved in several ways; for example, one of the following or a combination of these:

   — Level difference (kerb) of minimum 140 mm height;

   — Separation with street furniture, designed and located in accordance with 7.2 Street furniture;

   — Guardrails, in accordance with 7.1.13 Guarding along accessible routes.

c) Changes in levels highlighted with visual contrast on the edge of steps $C_M \geq 60$ %, with *LRV* of the lighter surface ≥ 50 points, (*LRV* difference ≥ 60 points) and a contrasting tactile surface as a warning at the approach to steps located in an open area. See 6.3 Visual contrast and 6.4 Tactile information.

d) Adequate artificial lighting see 15.1.2 Outdoor artificial lighting on accessible routes and according EN 12464-1 and -2 and CEN/TR 13201-1.

e) See EN 17210, no applicable technical specification

7.4.3 Pedestrian routes in squares and plazas

a) Accessible routes. See 7.1 Accessible routes.

b) Accessible routes following pedestrian desire lines, of the least possible distance and without detours.

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7.4.4 Seating and rest elements in squares and plazas

Seating provided at regular intervals along the square (e.g. equidistant throughout the perimeter), so that resting is possible at an intermediate point, for people who find it difficult to cross the entire square. See 11.3 Seating and resting areas.

7.5 'Shared Space' design approach

7.5.1 Rationale

See EN 17210, no applicable technical specification.

The functional requirements and recommendations in EN 17210 can be achieved by providing:

7.5.2 General

a) to c) See EN 17210, no applicable technical specification.

7.5.3 Gateway to a 'Shared Space'

A tactile contrast, attention surface, and visual contrast between the ground surface at the gateway to the shared space and adjacent conventional street (footway and road); plus a narrowing of the carriageway or other features to highlight the gateway to the shared space such as street art or trees. Visual contrast of ground surface of $C_M \geq 30$ % (*LRV* difference ≥ 30 points), with *LRV* of the lighter surface ≥ 40 points.

7.5.4 Design to promote pedestrian priority

a) to c) See EN 17210, no applicable technical specification.

d) See 8 for accessible car parking spaces.

e) See EN 17210, no applicable technical specification.

f) See EN 17210, no applicable technical specification.

g) See 6.6 Signage.

7.5.5 Provision of comfort zones

a) Visual contrast $C_M \geq 30$ % (*LRV* difference ≥ 30 points), with *LRV* of the lighter surface ≥ 40 points, see 6.3 Visual contrast. Plus, physical and tactile delineation such as a kerb or street furniture.

b) See 7.1.6 Width of the accessible route.

c) See 7.3 Pedestrian crossings.

d) See 7.1.6 Width of the accessible route, and 7.2 Street furniture.

e) Street furniture not impeding sight lines between drivers and sighted pedestrians.

f) See 7.3 Pedestrian crossings and 6.4.2 Tactile Walking Surface indicators (TWSI).

g) See 6.4.4 Tactile maps, models and floor plans.

h) See 6.4.4 Tactile maps, models and floor plans.

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7.5.6 Paving material

a) See 7.1.5 Surface of the accessible route

b) See EN 17210, no applicable technical specification.

c) A visual contrast equivalent to less than $C_M \geq 20$ %, 20 points difference on the *LRV* scale, of decorative patterns in paving surfaces.

NOTE Persons with vision and/or cognitive impairments can perceive light with dark or dark/light paving to be a drop or step.

d) See 0 Surface of the accessible route.

7.5.7 Pedestrian crossings

See 7.3 Pedestrian crossings.

NOTE In an effective 'Shared Space', many pedestrians can cross the space freely, following desire lines. However, some users (such as persons with sensory and cognitive impairments) are likely to experience difficulties to cross the 'Shared Space' without the use of pedestrian crossings.

7.6 Plantings

7.6.1 Rationale

See EN 17210, no applicable technical specification.

The functional requirements and recommendations in EN 17210 can be achieved by providing:

7.6.2 Positioning

a) Plants and trees placed outside the clear width of accessible routes planted in beds or pits with a smooth transition from the surrounding ground or surface finish; raised planters, where present, not tapering downwards, with minimum height of 150 mm from ground level and visually contrasting with the surrounding surface finishes and with plants which do not intrude over pedestrian accessible route; vegetation trimmed or cut back across pathways within a zone extending from ground level up to 2,5 m (BS 8300-1:2018, 10.9 and Annex A, 3.4). See also 7.1.5 Surface of the accessible route, 7.1.15 Obstacles on an accessible route and 6.3 Visual contrast.

b) Placed away from signage at pedestrian crosses or regularly trimmed at a maximum height of 1 100 mm.

c) See EN 17210, no applicable technical specification.

NOTE High level of maintenance at certain times of the year, when leaves or fruit or seed pods are likely to fall on pedestrian routes reduces the risk of slipping (BS 8300-1:2018, Annex A, 3.4).

7.6.3 Guarding

a) Edge protection at the tree opening with a minimum height of 100 mm and visually contrasting with the surrounding surface finishes or surface grids. See also b), 7.1.15 Obstacles on an accessible route and 6.3 Visual contrast.

b) Surface grids, level with the surrounding surface and with grating slots of maximum width of 13 mm. See also 7.1.9 Drainage of the accessible route.

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NOTE Smooth or paved permeable surfaces are preferred to tree grilles (grids), when practicable, as they are less hazardous for people using mobility aids such as sticks, white canes, wheelchairs or wheeled walking frames, or for people with assistance dogs (BS 8300-1:2018,8.2.1.7).

c) See EN 17210, no applicable technical specification.

7.6.4 Planting height

a) See 7.1.10 Headroom on accessible route.

b) Shrubs and bushes on the boundaries of accessible routes or next to seating areas trimmed at a maximum height of 1 100 mm.

7.6.5 Plant selection

a) Non-poisoning plants and plants with the least possible amounts of allergic pollen (without high pollen production and with low pollen dispersal) near seating areas, or approaches and entrances to buildings (NS 11001-1, E:2018, 6.8.5).

b) and c) See EN 17210, no applicable technical specification.

7.7 Pedestrian bridges and underpasses

7.7.1 Rationale

See EN 17210, no applicable technical specification.

The functional requirements and recommendations in EN 17210 can be achieved by providing:

7.7.2 Location

a) Approaches and exits located in continuation of the accessible route as a means of crossing the obstacle (e.g. river, railway, road or similar obstacle) without a long detour (BS 8300-1:2018, 9.5).

b) Locations for pedestrian bridges allowing level, gently sloping or ramped access, according to the natural topography. See also 7.7.3 a).

c) Accessible lift(s) with weather protection, such as a roof covering the entrance, the lift controls and any waiting area (BS 8300-1:2018, 9.4). See also 10.4 Lifts.

7.7.3 Approaches to pedestrian bridges and underpasses

a) See EN 17210 and 7.1.4 Step-free accessible routes.

b) See EN 17210 and 7.1 Accessible routes (7.1.3 Signage, orientation and wayfinding) and 6.6 Signage.

c) See EN 17210 and 7.1.4 Step free accessible routes.

d) See EN 17210 and 7.1.9 Drainage of the accessible route.

e) See EN 17210 and 7.2 Street furniture.

7.7.4 Design of pedestrian bridges and underpasses

a) Underpasses on a straight line with clear views from one side of the route to the other (BS 8300-1:2018, 9.5).

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b) See EN 17210, no applicable technical specification.

NOTE Security cameras improve security (BS 8300-1:2018, 9.5).

c) See EN 17210 and 7.1.6 Width of the accessible route.

d) Cover in the form of roof, canopy or similar construction throughout the entire length of the bridge (BS 8300-1:2018, 9.5).

e) Call points with two-way communication system, according to the multiple-sense principle. See also 6.5 Audible information and hearing enhancement and 13.3 ICT user interfaces.

7.7.5 Lighting on pedestrian bridges and in underpasses

a) See EN 17210 and 7.1.14 Lighting on accessible routes and 15.1 Lighting.

b) See EN 17210 and 15.1 Lighting.

8 Arrival and departure areas – Parking areas

8.1 Rationale

See EN 17210, no applicable technical specification.

The functional requirements and recommendations in EN 17210 can be achieved by providing:

8.2 Boarding points/Set-down points

a) Signposted with International Symbol of Access (ISA). See ISO 7001:2007, PI PF 006.

b) With a kerb ramp (see 7.3.5 Level access of kerb ramps and raised pedestrian crossings) where there is a difference level.

c) For vehicles with special lifting devices, a free manoeuvring space: an additional 2 400 mm on the side and an additional 1 500 mm (or preferably 2 400 mm) behind the car.

d) Clear space for passengers at a stopping point close to the entrance, with the possibility of a turning circle of minimum 1 500 mm diameter, 1 800 mm diameter preferred (Ireland, Building Regulations 2010, Technical Guidance Document M, Access and Use: Section 1.3-CIrculation within buildings other than dwellings 1.3.4.2 (e).

e) Seating near the boarding point for waiting passengers (see 11.3 Seating and resting areas).

f) Tactile Walking Surface Indicators (TWSI) towards the main entrance (see 7.1.3 Signage, orientation and wayfinding).

See also Figure 29.

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