Route guidance

Tactile route guidance for people with visual impairments

Design guidelines for guidelines and tactile guidelines in public spaces, buildings, public transport hubs and stops

Basic version – 2013
### Foreword

Introduction

INTRODUCTION

ROUTE GUIDANCE STRUCTURE

- Principles

CONSTRUCTION

CONTRAST

CERTIFICATION

Lines & decision points

GUIDELINE (general description)

GUIDELINE (images)

TACTILE GUIDELINE (general description)

TACTILE GUIDELINE (types)

WARNING MARKING (general description)

WARNING MARKING (types)

OBJECT MARKING (description)

BOARDING MARKING (description)

CROSSING LINE (description)

ATTENTION SURFACE (description)

DETAILING

CORNER SOLUTIONS

JUNCTIONS

OFFSETS

GUIDELINE END POINT AND CONNECTION

DOORS AND LIFTS

STAIRS

RAMPS

CROSSING POINTS

TACTILE GUIDELINES IN PUBLIC TRANSPORT SITUATIONS

STOPS AND PLATFORMS
People with visual impairments depend to varying degrees on clear, unambiguous, predictable and orientation-focused guidance for their orientation. In public spaces, this guidance is primarily provided by guidelines\(^1\) and tactile guidelines\(^2\).

The first version of these design guidelines was developed in 2009 by the PBT Foundation in collaboration with VIZIRIS (now the Oogvereniging). This completely updated version was prepared by the successor to the PBT Foundation, PBTconsult BV. This new version was again produced in close collaboration with the Oogvereniging, in order to ensure the target group has ownership of the solutions described in this document.

In 2012, the international ISO / FDIS 23599 standard for route guidance was released. The principles that can be implemented in the Dutch situation are reflected in this document.

In new situations, we always recommend application of 300mm wide tactile guidelines. Over the long term, existing 600mm lines can be replaced with the new 300mm wide tactile guidelines during major renovations and repaving. The visual and tactile properties of the 300mm wide lines have higher standards requirements than the 600mm wide lines. This is in accordance with the international development of ISO/FDIS 23599.

This updated version is available to read and download on the PBTconsult website. For further information: www.pbtconsult.nl.

This document serves as a handbook on the design of safe, usable and consistent route guidance, for use by municipalities, urban planners, architects and others involved in the design of public spaces and buildings.

The primary goal of this standardization is to enable people with visual impairments to find their way safely and confidently, on the basis of uniform solutions, regardless of where they are located in the Netherlands.

It is expected that this publication will develop further over time in accordance with technical advancements, particularly in the field of linking intelligence, e.g. digital/internet, to route guidance.

PBTconsult would like to thank everyone who collaborated on this publication, which is unique in the Netherlands (and Europe).

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\(^1\) Guidelines are natural or pre-existing structures that may be used to determine location and direction.

\(^2\) Tactile guidelines are routes that are specially created in an area and that are detectable by both visual and tactile means.
Route guidance, tactile route guidance for people with visual impairments

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Route guidance, tactile route guidance for people with visual impairments

1. INTRODUCTION
INTRODUCTION

Route guidance is primarily intended for people with visual impairments who are unable to navigate independently without this method of support. Guidelines and tactile guidelines are, therefore, not a goal in themselves, but merely a tool for orientation. They need to be kept in good condition by the road authorities in order to maintain their significance and function.

Guidelines and tactile guidelines communicate findability and followability to users by two means:

- Tactile
- Visual

The tactile properties of a tactile guideline, the bars, should be clearly distinct from the surface so that they can be easily felt with a cane and/or the feet. The visual properties should enable the visually impaired to distinguish the presence and direction of the line in comparison with the surrounding paving and/or flooring.

This can be achieved by producing the lines and/or bars in a clearly contrasting colour with respect to the surrounding paving and/or flooring. Most of the users who follow this type of route guidance make use of both the tactile and visual properties of tactile guidelines.

Since 300mm wide lines are 50% smaller than the traditional 600mm wide tactile guidelines, higher demands are placed on both tactile and visual findability. Therefore it is no longer permitted to use the narrow (10mm) bars in tactile guidelines with a width of 300mm.

This document only describes the guidelines and tactile guidelines that form part of the guidance route. Other markers, such as signage and braille texts, are not described in this document. The descriptions and criteria for these components can be found in other documents such as the ITS criteria.

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3 Accessibility concerns the properties of the built environment that enable people - diverse as they are - to do what they need to do, according to the purpose. The integration of the 'accessibility quality' in the construction process is an increasingly integrated development. There is a great need within the construction industry for clear guidance on the specific accessibility requirements relating to particular situations, while potential users of the built environment want to know what level of accessibility they can expect to find in specific situations.

There is a general and independent quality standard for this purpose: International Accessibility Symbol (abbreviated: ITS). Nationally, the ITS is used to indicate that an object is accessible, enterable and usable for anyone who can reach the object or the outdoor space independently. The ITS was accepted by Rehabilitation International in 1969. In 1971, the symbol was introduced in the Netherlands. The ITS is a legally protected trademark. In the Netherlands, it is registered by the Netherlands Council of the Chronically Ill and Handicapped (CG Raad). The ITS criteria form the requirements for this standard. They were developed by PBTconsult and can be found at www.pbtconsult.nl/its-criteria.
Consequently, these draft guidelines should be used in combination with the Dutch standard for accessibility, the ITS criteria, in order to design and implement a complete facility for people with visual impairments.

This document contains no references to suppliers of tactile guidelines or their components, but merely describes the requirements that the lines and sections of route guidance must meet. In addition, this document describes how tactile guideline meeting points and connections to other elements (guidelines, stairs, etc.) should be realized.

Practice is often more difficult than theory and therefore it is possible that alternative/creative solutions need to be sought for certain situations. In these cases, the principles of the solutions contained in this document should always serve as the basis. PBTconsult and the Oogvereniging can provide advice on the implementation of consistent solutions for specific situations.

People with visual impairments must be able to rely on the consistency of tactile guidelines. Ad hoc solutions, where the provisions of these guidelines are not followed are, by definition, incorrect, and can cause dangerous situations for users.
2.

ROUTE GUIDANCE STRUCTURE

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## Principles

### Primary principles

1. Tactile guidelines are only installed in safe, pedestrian-designated areas.

2. It is not permitted to have overhanging elements less than 2.300mm above the tactile guideline (and the obstacle-free strips to the left and right of the line).

3. Tactile guidelines are always to be used in two directions (so no one-way traffic!).

4. Given its findability and guidance function, a tactile guideline contrasts in colour and texture compared to the surrounding pavement / flooring.

5. A tactile guideline contains the minimum number of angles, nodes and decision points possible.

6. In public spaces where guidelines could be used instead of tactile guidelines, this should be done wherever possible.

### Location dependent principles

1. Public spaces - general: Tactile guidelines are only used for making public areas (e.g. city centres, shopping centres) and public buildings (e.g. Town hall, museum, hospital) accessible from the nearest public transport stops. These areas and buildings can, if desired, also be made accessible to and from each other by means of a combination of guidelines and tactile guidelines.

2. Public transport - general: The line goes through the wide public transport gate. It should always be possible to walk through this gate in both directions.

3. Principles of an accessible route (height differences):
   a. If there is only a staircase present: A potential tactile guideline only goes via the staircase in the case of restricted-access objects (objects without a lift or ramp). Objects where a height difference is solely bridged by a staircase do not comply with ITS criteria.
   b. If there is only a staircase and ramp: Tactile guidelines (in public transport hubs) follow the main pedestrian traffic flow route via a staircase to and from a platform.
   c. If there is only a staircase and lift: Tactile guidelines (in public transport hubs) follow the main pedestrian traffic flow route via a staircase and a lift, to and from a platform.
   d. If there is only a lift: Tactile guidelines (in public transport hubs) follow the main pedestrian traffic flow route via the lift, to and from a
platform.
e. If there is only a ramp:
Tactile guidelines go via the ramp. (With public transport, this applies to "terminus" stations.)

4. Public transport hubs:
a. In principle, the main pedestrian traffic flow route in and around a public transport hub is always equipped with tactile guidelines.
   i. Bus stop / station
   ii. Tram stop / station
   iii. Train station
   iv. Metro station
   v. Express tram station/stop
   vi. Taxi ranks
   vii. "Kiss and Ride"
   viii. Ferries
   ix. Route(s) to the town centre(s)
b. All transport-related destinations in a public transport hub are connected to each other using tactile guidelines (even where a wall, for example, is also available as a guideline).
   i. Public transport (OV) chip card machines and card machines (provided they are ITS certified)
   ii. Staffed ticket sales points
   iii. Public transport information machines
   iv. S&A posts (SOS and Advice posts)
   v. Offshoots to shops, kiosks, toilets, etc. are not made. These components are seen as extra services in or in the immediate vicinity of a public transport hub, and are not considered necessary to be able to make a journey.

NB: The tactile guidelines at all public transport points mentioned above must be connected to the tactile guidelines and/or guidelines on the public roads connecting to the public transport points.
Above all, route guidance is about the nodes. The tactile guideline or guideline simply serves to connect these points. The information these nodes relay to users is of essential importance. Great care must therefore be taken with the implementation of these nodes.

A guidance route forms a one dimensional navigation to be used in two directions, and comprises two elements:

- **Guideline**
  These are natural and pre-existing structures in the area, which can serve to define location and direction.

- **Tactile guideline**
  These are specially created routes in an area, which are detectable by both visual and tactile means.

Tactile guideline segments form the connections between two decision points.

In principle, a tactile guideline segment is a straight line. Kinks of up to 15 degrees are permitted, as are offsets from the line, with a maximum distance of the width of the line.

The decision points in the tactile guidelines are points where:

- the start/end of the tactile guideline are indicated
- users must make choices
- changes in the direction of the line are indicated
- warning is given of an approach to a potentially dangerous situation

The various types of decision points are illustrated in the above diagram.

- **Start/end**
  A “start/end” decision point always has an **attention surface** (see section 4). “Start/end” decision points in dangerous locations, such as road crossings, at the top of stairs and at tactile guideline end points on platforms, also have **warning markings** (see section 3).
Where a tactile guideline segment leads to an information point, there is an **object marking** at the start of the line (see section 3). Where a tactile guideline segment leads to a boarding point for a bus or taxi, this boarding point location will have an **entry marking** (see section 4).

- **Choice**
  At a tactile guideline node, a user has to make a choice. The code in the line is an attention surface.

- **Angle**
  Where a tactile guideline changes direction and the angle created is greater than 15 degrees, an attention surface is used. When the angle is less than 15 degrees, there are no extra provisions in the line and the line flows on uninterrupted.

- **Alarm**
  Decisions points with warning markings are always used in situations where users must be alerted that they are approaching a dangerous point: road crossings, the top of stairs and at tactile guideline end points on platforms.
3. CONTRAST

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**CONTRAST**

Every colour has a light reflectance value. The contrast value is the difference between two light reflection values.

The perception of colours and contrast cannot be fixed, this is personal and is influenced by a combination of several external factors, such as:

- Discolouration of the original colours due to ageing and pollution
- Wet (shimmer) and dry conditions
- The position of the sun (backlight)

When making calculations of the contrast values, one should use the light reflectance values of NCS and RAL colours set out in the "Translation Table NCS Lightness, Edition 3 2007" from the Scandinavian Colour Institute AB. (An excerpt from the RAL colours light reflectance values is included in Appendix 1).

If the colour is not formally defined, the light reflectance value can be determined by selecting a similar RAL or NCS colour (by means of observation or a light reflectance metre).

**DETERMINATION OF CONTRAST VALUE**

A tactile guideline’s contrast value can be determined on the basis of the difference of the light reflection factors of the tactile guidelines (strips) and warning markings (surfaces and studs) compared to the floor surface and/or adjacent paving/flooring, so they are visually detectable.

The calculation can be performed using the Michelson formula.

\[
\frac{(L_{\text{max}} - L_{\text{min}})}{(L_{\text{min}} + L_{\text{max}})} = K
\]

- \(K\) is the Contrast value
- \(L_{\text{max}}\) is the light reflection value of the strip, bar and/or stud
- \(L_{\text{min}}\) is the light reflection value of the floor surface and/or adjacent paving/flooring

The minimum \(K\) value is dependent on the type of tactile guideline (see TACTILE GUIDELINE section).
4. CERTIFICATION

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<table>
<thead>
<tr>
<th><strong>CERTIFICATION</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Nowadays there are many tactile guideline products on the market, such as strips, studs, sound tiles, etc. These products often come from abroad and do not meet Dutch standards. The deviations are not only present in the dimensions but also, for example, in the use of materials. These guidelines do not comment on durability of materials, but do specify the properties which these materials must possess: non-slip, prevention of glare caused by reflection, light reflectance values, contrast value, etc.</td>
</tr>
<tr>
<td>PBTconsult has established a certification system for tactile guideline designers, tactile guideline product manufacturers and other professionals involved in this field, covering:</td>
</tr>
<tr>
<td><strong>1. Certification of tactile guideline products</strong></td>
</tr>
<tr>
<td>• Monolith tiles (inc. bars)</td>
</tr>
<tr>
<td>• Bars (prefab)</td>
</tr>
<tr>
<td>• Bars (made on site)</td>
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<tr>
<td>• Studs (prefab)</td>
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<tr>
<td>• Studs (made on site)</td>
</tr>
<tr>
<td>• Object markings</td>
</tr>
<tr>
<td>• Entry markings</td>
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<tr>
<td>Certified tactile guideline products are published on our website <a href="http://www.pbtconsult.nl">www.pbtconsult.nl</a>.</td>
</tr>
<tr>
<td><strong>2. Certification of tactile guidelines</strong></td>
</tr>
<tr>
<td>• Design certification (on the basis of drawings)</td>
</tr>
<tr>
<td>• Route certification (on the basis of implementation)</td>
</tr>
<tr>
<td>For further information about terms, procedures, costs, validity, etc., see our website <a href="http://www.pbtconsult.nl">www.pbtconsult.nl</a></td>
</tr>
</tbody>
</table>
5.

LINES & DECISION POINTS

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GUIDELINE (general description)

Guidelines form part of the guidance route, but in fact they are not physically part of the tactile guidelines. Guidelines are natural or pre-existing structures that can be used to determine location and direction. Guidelines have few requirements, other than that it should be possible to feel them with the foot or a cane.

Guidelines are generally not expressly built for the purpose of route guidance, however certain structures, especially in public spaces, can be designed so that they can serve as guidelines.

Design:
- A difference in surface structure which can be felt with the foot or a cane (e.g. pavement - grass)
- Height difference ≥ 50mm (e.g. pavement edge or wall)

Detailing:
- No further specifications.
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**GUIDELINE (images)**

- **Balustrade as guideline**
- **Handrail and balustrade as guideline on a ramp**
- **Facade as guideline**
- **Smooth guideline, grey concrete tiles (300mm) in an uneven street surface (e.g. historic cobblestones)**
- **Smooth guideline, white concrete tiles (300mm) in an uneven street surface (e.g. historic cobblestones)**
- **Smooth guideline, natural stone (300mm) in an uneven street surface (e.g. historic cobblestones)**
TACTILE GUIDELINE (general description)

Tactile guidelines define location and direction.

Tactile guidelines are installed on horizontal floor surfaces as well as on ramps.

*Code for users: it is safe on the line and on an obstacle-free strip of 600mm on both sides. (This means, for example, that a tactile guideline may never be laid on a road.)*

**Design:**
- Strip with bars
- Clearly detectable (tactile and visual) line in the paving / flooring
- Colour of the tactile guidelines, preferably white
- For further description of the detailing, see section 6, p. 53

**Detailing:**
- Tactile guideline width: 300mm or 600mm
- 300mm line:
  - 4 trapezoidal bars or 6-7 sinusoidal bars across the strip width
  - height of the bars: 3-5mm, depending on the type of bars and adjacent paving/ flooring (see table in bar shape overview)
- 600mm line:
  - 8 - 10 bars or 12/14 sinusoidal bars over the width of the strip
  - height of the bars: 3-5mm, depending on the type of bars and adjacent paving/ flooring (see table in bar shape overview)
- Width and shape of the bars dependent on the width of the tactile guideline and the number of bars: approx. 10-30mm
- Where interruptions are necessary for water drains/refuse:
  - bar length: 200 - 600mm
  - bar interruption for drainage approx. 10-30mm per 600mm
- Direction of the bars: walking direction
- Minimum length for (a section of) a tactile guideline is 1800mm
- Minimum distance between two attention surfaces is 3000mm
TACTILE GUIDELINE (types)

There are 3 distinct basic types of tactile guideline:

**Type 1:**
With this type of tactile guideline, the strip and the bars are the same colour. The colour of the strip and bars contrasts with the adjacent paving/flooring. This line is mostly produced in the same material as the adjacent paving, e.g. concrete / tiles, natural stone, ceramic tiles, composite tiles.

*K-value strip (inc. bars) – floor surface (see CONTRAST section)*

<table>
<thead>
<tr>
<th>Bar shape</th>
<th>300mm</th>
<th>600mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>RA</td>
<td>$K \geq 0.3$</td>
<td>$K \geq 0.3$</td>
</tr>
<tr>
<td>RB</td>
<td>$K \geq 0.3$</td>
<td>$K \geq 0.3$</td>
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<td>RC</td>
<td>$K \geq 0.3$</td>
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<td>$K \geq 0.3$</td>
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<tr>
<td>RG</td>
<td>$K \geq 0.3$</td>
<td>$K \geq 0.3$</td>
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</tbody>
</table>

**Type 2:**
This type of tactile guideline consists solely of bars that are installed on/in the paving/flooring. The colour of the bars contrasts with the adjacent paving/flooring. This tactile guideline is mostly produced in epoxy, PMMA and synthetic materials.

*K-value bars – floor surface (see CONTRAST section)*

<table>
<thead>
<tr>
<th>Bar shape</th>
<th>300mm</th>
<th>600mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>RA</td>
<td>n/a</td>
<td>n/a</td>
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<tr>
<td>RB</td>
<td>$K \geq 0.4$</td>
<td>$K \geq 0.4$</td>
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<tr>
<td>RC</td>
<td>$K \geq 0.4$</td>
<td>$K \geq 0.4$</td>
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<tr>
<td>RE</td>
<td>$K \geq 0.4$</td>
<td>$K \geq 0.4$</td>
</tr>
</tbody>
</table>
Type 3:
This tactile guideline consists of a strip and bars where the strip is in a contrasting colour to the adjacent paving/flooring. The strip material is frequently the same as that of the adjacent paving/flooring, e.g. natural stone, ceramic tiles, composite tiles. The bars can be produced in another material.
For this type of tactile guideline only, the bars can also be produced in stainless steel. The condition for the use of stainless steel is that it may not cause glare when light falls on it. To prevent glare and danger from slippery, smooth surfaces, the walking surface must be profiled. The other stainless steel surfaces may not be polished.

<table>
<thead>
<tr>
<th>Bar shape</th>
<th>300mm</th>
<th>600mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>RA</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>RB</td>
<td>K: ≥0.3</td>
<td>K: ≥0.3</td>
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<tr>
<td>RC</td>
<td>K: ≥0.3</td>
<td>K: ≥0.3</td>
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<tr>
<td>RD</td>
<td>K: ≥0.3</td>
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<td>RE</td>
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<tr>
<td>RG</td>
<td>K: ≥0.3</td>
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</tbody>
</table>

*K-value strip (ex. bars) – floor surface* (see CONTRAST section)
WARNING MARKING (general description)

Warning markings are only installed in potentially dangerous locations, such as:

- Staircases (top)
- Crossing points
- Tactile guideline end points where there is no adjacent guideline to follow

Design:

- Studs
- Material that stands out from the surrounding paving in terms of colour and feel, depending on the situation
- Colour of warning markings, preferably white

Detailing:

- Stud surface: minimum 600 x 600mm
- Stud surface depth: 600mm
- Stud surface length: varies (min. 600mm), the centre of the surface length always lies in the centre of the length of the tactile guideline
- Studs in surface relief
- Studs in a square (orthogonal) grid pattern
- Grid size 50-68mm
- Direction of the grid pattern in relation to the tactile guideline - not relevant for the warning function
- Stud diameter: 25mm
- Stud height: 5mm

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WARNING MARKING (types)

The warning marking forms part of the tactile guideline. Consequently, the warning markings correspond to the types of tactile guidelines. The type of warning marking(s) used must always conform to the matching type of tactile guideline.

Type 1:
With this type of warning marking, the surface and stud colour is the same. The colour of the surface and studs contrasts with the adjacent paving/flooring. This marking is primarily applied in the same material as the adjacent paving e.g. concrete / tiles, natural stone, ceramic tiles, etc.

<table>
<thead>
<tr>
<th>Stud</th>
<th>Contrast</th>
</tr>
</thead>
<tbody>
<tr>
<td>NA</td>
<td>$K \geq 0.3$</td>
</tr>
<tr>
<td>NB</td>
<td>$K \geq 0.3$</td>
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<tr>
<td>NC</td>
<td>$K \geq 0.3$</td>
</tr>
<tr>
<td>ND</td>
<td>$K \geq 0.3$</td>
</tr>
</tbody>
</table>

**K-value surface (inc. studs) – floor surface (see CONTRAST section)**

Type 2:
This type of warning marking solely consists of studs that are applied on/in the paving/flooring. The colour of the studs contrasts with the adjacent paving/flooring. The stud material is mainly epoxy, PMMA or synthetic materials.

<table>
<thead>
<tr>
<th>Stud</th>
<th>Contrast</th>
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</thead>
<tbody>
<tr>
<td>NA</td>
<td>$K \geq 0.4$</td>
</tr>
<tr>
<td>NB</td>
<td>$K \geq 0.4$</td>
</tr>
<tr>
<td>NC</td>
<td>$K \geq 0.4$</td>
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<tr>
<td>ND</td>
<td>$K \geq 0.4$</td>
</tr>
</tbody>
</table>

**K-value studs – floor surface (see CONTRAST section)**
Type 3:
This comprises a surface and studs in a contrasting colour to the adjacent paving/flooring. The surface material is frequently the same as the adjacent paving/flooring e.g. natural stone, ceramic tiles, composite tiles, etc. The studs can be applied in another material. With this type warning marking, the studs may also be in stainless steel. The condition for the use of stainless steel is that it may not cause glare when light falls on it. To prevent glare and danger from slippery, smooth surfaces, the walking surface must be profiled. The other stainless steel surfaces may not be polished.

<table>
<thead>
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</tr>
<tr>
<td>ND</td>
<td>$K \geq 0.3$</td>
</tr>
</tbody>
</table>
OBJECT MARKING (description)

Object markings are used when there is an object located on the tactile guideline which provides the follower of the line with relevant information and/or a relevant function, for example an information post or, within public transport, a public transport chip card reader, card machine, SOS & Advice post. When the object is not located directly on the tactile guideline, an indication is given, along with the object marking, that a tactile guideline ("information line") runs to an information point.

Design:
- Material that contrasts in colour, feel and, where possible, sound, in relation to the surrounding paving. K-value marking – adjacent paving (see CONTRAST section): 0.3
- The material used must be non-slip

Detailing:
For example:
- Smooth sound tile
- Smooth rubber tile
- Ceramic tile
- Concrete tile trowel epoxy with carborundum inlay
- Steel / Aluminium (non-reflecting)
- Surface dimension: 600 x 600mm
- Profiling of slippery surfaces (e.g. steel, aluminium, ceramic) to improve tactile and non-slip properties.
BOARDING MARKING (description)

A boarding marking is used in situations where there is a fixed boarding point, such as at bus stops, taxi ranks, “kiss and ride” locations.

Design:
- Material that contrasts in colour, feel and, where possible, sound, in relation to the surrounding paving. K-value marking – adjacent paving (see CONTRAST section): 0.3
- The material used must be non-slip

Detailing:
For example:
- Smooth sound tile
- Smooth rubber tile
- Ceramic tile
- Concrete tile trowel epoxy with carborundum inlay
- Steel / Aluminium (non-reflecting)

- Surface dimension: 600 x 900mm
- Profiling of slippery surfaces (e.g. steel, aluminium, ceramic) to improve tactile and non-slip properties

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CROSSING LINE (description)

Crossing lines are special lines in a tactile guideline, solely used at level crossings at stations. A crossing line is always preceded by a warning marking.

Design:
- Rubber
- Clearly detectable (tactile) line in the ground surface at level crossings
- For further description of the detailing and connections, see section 6, p. 53

Detailing:
- 300mm wide
- Top surface has a curvature of 20mm (edges of the line flush with the ground)
### ATTENTION SURFACE (description)

Attention surfaces are interruptions in tactile guidelines providing specific information to the users, such as:

- Change of direction and/or T-junction and/or crossroads
- Indication of an object marking
- Pre-warning of a warning marking
- Ramp alert
- Warning marking alert

---

### Design:

- Interruption of the tactile guideline
- Surface is paved/finished with the same material that already surrounds the tactile guideline
- If the paving material has a rough finish (e.g. old street bricks), it is preferable to implement the object marking using smooth paving material, such as concrete tiles

### Detailing:

- Max. 600 x 600mm when using the existing paving
- 300 x 600mm for alert surfaces

---

Indication of an object marking in this document.

Location of an object marking in relation to a tactile guideline.
6. DETAILING

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CORNER SOLUTIONS

An object marking is used at every decision point in a tactile guideline (corner, junction, exit, etc.). An object marking forms part of the tactile guideline, but is implemented using the same paving that surrounds the tactile guideline.

Exceptions to this can occur when the adjacent paving has a rough texture (e.g. old bricks with deep joints) leading to lack of tactile distinction between the tactile guideline and the paving. In these situations, the object marking must be implemented using a smooth material (e.g. concrete tiles).

5-01

For corners of more than 15 degrees in tactile guidelines, an object marking must always be provided (see also illustration 5-02).

- Attention surface in basis 600 x 600mm

5-02
**5-03**

A kink in a tactile guideline which is lesser than or equal to 15 degrees may be implemented without interruption.

**5-04**

Tactile guidelines may "bend". The minimum bend radius is 10m (measured at the centre line of the tactile guideline).
### JUNCTIONS

An object marking is used at every decision point in a tactile guideline (corner, junction, exit, etc.). An object marking forms part of the tactile guideline, but is implemented using the same paving that surrounds the tactile guideline.

<table>
<thead>
<tr>
<th>5-05</th>
<th></th>
<th>5-06</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>T-junction</strong></td>
<td><img src="image1.png" alt="T-junction diagram" /></td>
<td><strong>Crossroads</strong></td>
</tr>
<tr>
<td>- Attention surface 600 x 600mm.</td>
<td><img src="image3.png" alt="T-junction image" /></td>
<td>- Attention surface 600 x 600mm.</td>
</tr>
</tbody>
</table>
OFFSETS

There should be as few as possible “obstacle offsets” in a tactile guideline. Offsets may be used where there is no viable alternative (e.g. to avoid dangerous situations). The maximum offset distance is equal to the width of the line. The maximum number of consecutive offsets is 3. Offsets in the line may not disorientate the users. U-turn diversions cause disorientation and for this reason they may not be used.

5-07

In situations where the offset is necessary in order to circumvent an obstacle, this can be achieved using the adjacent diagram. The conditions for these offsets are:

- Offset in the tactile guideline = width tactile guideline
- Maximum 3 offsets
- Length of offset line 1800mm
- Minimum distance (in walking direction) from tactile guideline to obstacle 1500mm
GUIDELINE END POINT AND CONNECTION

A tactile guideline can end in two ways:

- With a warning marking (this indicates that the line stops and that there is a dangerous situation if people walk further). The best option is to turn around and follow the line back.
- The tactile guideline goes over a guideline (or vice versa).

Where there are (natural) guidelines, these should be used and tactile guidelines do not have to be implemented. However, this does not apply to public transport hubs. Tactile guidelines should always be applied in these cases unless it is not possible. This should be assessed on a case-by-case basis.

5-08
When there is no guideline at the end of a tactile guideline, e.g. at the end of a platform (a tactile guideline must end 10m before the end of the platform), this end point must be indicated by a 600 x 600 mm warning marking.

5-09
A tactile guideline can end in front of a counter. Since this end point is not dangerous for the user, warning markings do not have to be used.
**5-10**
For the transition between a tactile guideline and a guideline (and vice versa), there must be an overlap of 600mm between the tactile guideline and the guideline.

**5-11**
**Right angle connection 300mm wide tactile guideline (1)**
Where a 300mm wide tactile guideline arrives at a guideline at or close to a right angle, 1800mm long tactile guidelines must be applied at either side of the tactile guideline and parallel to the guideline.
In this way, people following the guideline can be alerted to the presence of a decision point. A 300mm wide tactile guideline approached at right angles can be missed, by stepping over it. By making a node, people use the object marking to look for the various walking directions.
5-12
Right angle connection 300mm wide tactile guideline (2)  
A 300mm wide tactile guideline approached at right angles can be missed, by stepping over it. This can be prevented by widening the connection with the guideline to 600mm over a length of 1200mm.

5-13
If a tactile guideline runs in the same direction as the guideline but at a distance of more than 600mm, maximum 1200mm, the line can be staggered in relation to the guideline in accordance with the solution described in figure 5-07.
Where there is a door on the tactile guideline, the line continues on. In the case of revolving doors, the line stops and the revolving doors form a guideline.

**5-14**

Tactile guideline at a door

**5-15**

Tactile guideline at revolving doors
Tactile guideline at a lift door

Route guidance: tactile route guidance for people with visual impairments
A warning marking must always be provided at the top of a staircase. A tactile guideline always connects on the right hand side at the top of the stairs. The distance from the side of the tactile guidelines to the middle of the handrail is min. 300 to max. 600 mm. There must always be an object marking (300 mm) between the tactile guideline and the front edge of the bottom step. A warning marking is never used at the bottom of the stairs.

- At the top of a staircase, a tactile guideline is always placed on the right.
- At the bottom of a staircase, a tactile guideline is always placed on the left.

**NB:** For stairs in public transport hubs, these requirements only apply to staircases within the main pedestrian traffic flow route which are designated as accessible staircases.

The minimum width of the warning marking depends on the width of the tactile guideline.
- 300 mm wide lines → 1500 mm warning marking
- 600 mm wide lines → 1800 mm warning marking

For aesthetic reasons, the warning marking may be installed across the entire width of the staircase.
In the case of wide stairs where the handrails are not positioned at the sides, but elsewhere (for example in the middle of the staircase), the tactile guideline may lead to the handrail. The detailing at the beginning and end of the line is the same as with a standard staircase, as shown in figure 5-17.
For ramps, a distinction is made between slopes steeper than 1:20 and slopes equal to or less than 1:20. No additional provisions are necessary for slopes up to and including 1:20. For slopes steeper than 1:20, a handrail should be provided beside the tactile guideline along the length of the ramp and object markings should be provided at the top and bottom of the ramp.

5-28

Ramps with a slope angle up to and including 1:20.
Route guidance, tactile route guidance for people with visual impairments.

5-29

Ramps with a slope angle steeper than 1:20.
CROSSING POINTS

"Lined" crossings, or crossings which are a continuation of a natural guideline, are always provided with a warning marking, whether or not there is a height differential between pavement and road at the crossing. The length (size A) of the warning marking depends on the length of the crossing.

Size A: (minimum 1800mm)

<table>
<thead>
<tr>
<th>Lane Configuration</th>
<th>Size A (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 lane (or freestanding cycle path)</td>
<td>1800mm</td>
</tr>
<tr>
<td>2 lanes</td>
<td>2400mm</td>
</tr>
<tr>
<td>3 lanes</td>
<td>3000mm</td>
</tr>
<tr>
<td>4 lanes</td>
<td>3600mm</td>
</tr>
</tbody>
</table>

The direction of the tactile guideline preceding the warning marking indicates the crossing direction. Where possible (if there is enough space), an object marking should be provided between tactile guideline and warning marking.
At a Pelican crossing, the push button for a green man signal must always be placed directly next to the tactile guideline.
At crossings where several lanes have to be crossed, a warning marking should be provided at each lane (slow and fast traffic). The warning marking at a slow traffic lane (cycle path) is applied directly to the cycle path.

Where the length of the tactile guideline for the warning marking is more than 1200mm, 300mm attention surfaces are used.
If a pavement has no tactile guidelines and/or the location of the crossings is/will be a continuation of the existing guidelines, the crossings must be provided with a lowered kerb edge/raised road surface with a warning marking.

**A:** Crossings which are a continuation of the guideline/tactile guideline (provided with warning marking)

**B:** Crossings which are not a continuation of the guideline (without warning marking)

**5-35/36**

Oblique crossings/zebra crossings are only permitted where the crossing direction is supported by acoustic signaling. The direction of the tactile guideline preceding the warning marking also indicates the crossing direction.
Route guidance, tactile route guidance for people with visual impairments
7. TACTILE GUIDELINES IN PUBLIC TRANSPORT SITUATIONS
STOPS AND PLATFORMS

International safety regulations must be taken into account on stops and platforms, e.g. the TSI-PRM which applies to train transport.

6-09
BUS STOP
The adjacent diagram shows the situation where the tactile guideline runs as an access route directly from the pavement to the boarding marking.

6-10
BUS STOP
The adjacent diagram shows the situation where the tactile guideline runs as an access route to the boarding marking, parallel to the road.
Route guidance, tactile route guidance for people with visual impairments
Route guidance, tactile route guidance for people with visual impairments