

Australian/New Zealand Standard™

Design for access and mobility

Part 4: Tactile indicators



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AS/NZS 1428.4:2002

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Australian/New Zealand Standard™

Design for access and mobility

Part 4: Tactile indicators

Originated as AS 1428.4—1992.
Jointly revised and designated as AS/NZS 1428.4:2002

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PREFACE

This Standard was prepared by Standards Australia Committee ME-064, Access for People with Disabilities, to supersede AS 1428.4—1992, *Tactile ground surface indicators for the orientation of people with vision impairment*.

The objective of this Standard is to assist in providing a safer built environment for persons who are blind or vision impaired, with particular reference to tactile indicators.

This revision addresses the needs of people with physical mobility impairment and those of people who are blind or vision impaired. It includes the following changes to the previous edition:

- (a) The additional use of discrete TGSIs.
- (b) Dimensioning of applications of TGSIs has been increased from 300 ±10 mm to 300 mm to 400 mm and 600 ±10 mm to 600 mm to 800 mm.
- (c) Applications of TGSIs to kerb ramps and crossings.
- (d) Applications of TGSIs to bus, tram and light rail stops.
- (e) Removal of the spike from raised pavement markers.
- (f) The addition of new appendices and diagrams on the design, installation, and luminance contrast criteria for TGSIs.

The terms 'normative' and 'informative' have been used in this Standard to define the application of the appendix to which they apply. A 'normative' appendix is an integral part of a standard, whereas an 'informative' appendix is only for information and guidance.

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FOREWORD

People with disabilities have the right to dignified, safe and independent access to the built environment.

Approximately 330 000 Australians are blind or vision-impaired and many more have some reduction in the effectiveness of their sight, the majority of whom are over the age of 65 years. The ageing of Australia's population is expected to see the number of people with vision impairment double in 25 years.

This Standard deals with the application of tactile ground surface indicators in the built environment.

Application of this Standard will enhance the safety, dignity and independence with which people who are blind or vision impaired have access to the built environment.

Tactile ground surface indicators (TGSIs)

TGSIs provide cues, which, when combined with other environmental information, assist people who are blind or vision impaired with their orientation. Orientation is a person's awareness of where they are, where they are going, and where they have been.

A person's orientation, through processing all available environmental cues, will make the information provided by the TGSIs meaningful. Warning TGSIs indicate an approaching hazard but not what the nature of the hazard will be.

The application of TGSIs will not correct bad design or make an unsafe environment safe. It is essential that planners regard the application of TGSIs as integral to good design and that the information they provide is consistent.

TGSIs should be installed to provide guidance and/or warning of an obstruction or hazard in any location where insufficient alternative or 'natural' tactile cues exist.

TGSIs should not be proliferated unnecessarily, nor used to compensate for bad design. They should be used where the obstruction, hazard or change of direction of travel is less likely to be expected or anticipated and could be encountered, perhaps injuriously, in the absence of a suitably placed TGS1.

Luminance-contrast

The majority of people who are blind or vision impaired have some vision. The provision of sufficient luminance-contrast in the design of signage and the choice of TGSIs will enhance access to information for people with vision impairment and for all pedestrians.

The use of luminance-contrasting strips on the nosing of stairs has been proven to improve safety for people who are vision impaired, as well as for all pedestrians.

Similarly, luminance-contrast principles applied to signage will be of benefit to all users. See Clause 1.5 for a definition of luminance-contrast.

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Australian/New Zealand Standard
Design for access and mobility

Part 4: Tactile indicators

SECTION 1 SCOPE AND APPLICATION

1.1 SCOPE

This Standard sets out requirements for new building work, for the design and application of tactile indicators, to ensure safe and dignified mobility of people who are blind or vision impaired.

NOTES:

- 1 Information on the design and installation of tactile indicators is given in Appendix B.
- 2 Guidance on typical TGSIs applications for kerb ramps, medians and multiple entry points is given in Appendix C.
- 3 Information on raised pavement markers is given in Appendix D.
- 4 Typical examples of TGSIs for bus stops and trams/light rail platforms are given in Appendix E.
- 5 A list of the documents that were referred to in the preparation of this Standard is given in Appendix G.

1.2 APPLICATION**1.2.1 General**

This Standard is applicable to the internal and external built environment, throughout Australia and New Zealand, in potentially hazardous situations as outlined in Clause 2.2.3.1.

1.2.2 New Zealand only

NZS 4121 is cited, in subsection 3 of Section 47A of the Building Act 1991, as a means of compliance with the building code. For those wishing to go beyond these minimum requirements, this Standard provides additional criteria.

The Local Government Act 1974, Section 331(2) states 'in forming or reforming any road or part thereof (not being a road in a rural area), the council shall ensure that reasonable and adequate provision is made for kerb and channel of any footpath or part thereof to be formed or reformed so as to permit safe and easy passage from kerb to kerb of any mechanical conveyance normally and lawfully used by a disabled person'.

NZS 4121 identifies a means of providing reasonable and adequate provision, while this Standard provides additional requirements.

1.3 SYSTEMS AND MATERIALS

This Standard does not preclude the use of any materials or systems not covered herein; however, any such materials or systems may require regulatory approval as an alternative solution.

1.4 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

AS	
1428	Design for access and mobility
1428.1	Part 1: General requirements for access—New building work
1428.2	Part 2: Enhanced and additional requirements—Buildings and facilities
1683	Methods of test for elastomers
1683.4	Method 4: Rubber—Vulcanized—Determination of density
1683.11	Method 11: Tension testing of vulcanized rubber
1683.12	Method 12: Rubber, vulcanized or thermoplastic—Determination of tear strength (trouser, angle and crescent test pieces)
1683.15.2	Method 5.2: Durometer hardness
1683.21	Method 21: Rubber—Vulcanized—Determination of abrasion resistance using a rotating cylindrical device
1683.23	Method 23: Rubber—Vulcanized—Determination of resistance to liquids
1683.24	Method 24: Rubber—Determination of resistance of vulcanized or thermoplastic rubbers to ozone cracking—Static strain test
1735	Lifts, escalators and moving walks
1735.12	Part 12: Facilities for persons with disabilities
2353	Pedestrian push-button assemblies
2700	Colour Standards for general purposes
4455	Masonry units and segmental pavers
AS/NZS	
1580	Paints and related materials—Methods of test
1580.601.2	Method 601.2: Colour—Principles of colour measurement
1580.601.4	Method 601.4: Colour—Calculation of colour differences
4586	Slip resistance classification of new pedestrian surface materials
NZS	
4121	Design and access for mobility—Buildings and associated facilities
HB	
197	An introductory guide to the slip resistance of pedestrian surface materials
ASTM	
D 575	Standard Test Methods for Rubber Properties in Compression
ISO	
13006	Ceramic Tiles—Definitions, classification, characteristics and marking
AUSTROADS	
	Guide to Traffic Engineering Practice
	Part 13: Pedestrians

1.5 DEFINITIONS

For the purpose of this Standard, the definitions below apply.

1.5.1 Accessible

Describes all or part of a site, building or facility that complies with AS 1428.1.

1.5.2 Accessway

Continuous accessible path of travel.

1.5.3 Angle of approach

The angle of intersection between the centre-lines of two continuous accessible paths of travel.

1.5.4 Carriageway

The portion of a road or bridge assigned to the movement of vehicles, inclusive of any shoulders and auxiliary lanes. It is usually designated as that part of a public road (way) between kerbs.

1.5.5 Circulation space

The net unobstructed area for a minimum height of 2000 mm above the finished floor or ground surface (unless otherwise specified in this Standard), which is that space surrounding built elements, landscape elements, and fixtures and fittings required for movement into and within buildings.

1.5.6 Continuous accessible path of travel (accessway)

An uninterrupted path of travel to or within a building, providing access to all required facilities.

NOTE: For non-ambulatory people, this continuous accessible path of travel should not incorporate any step, stairway, turnstile, revolving door, escalator or other impediment, which would prevent it from being safely negotiated by people with disabilities.

1.5.7 Depth

The distance measured along the direction of travel.

1.5.8 Directional indicator

An indicator used as a guide to a safe route, indicating direction to travel, which is laid in the direction of travel.

1.5.9 Discrete TGSIs

Tactile domes that are individually installed.

1.5.10 Handrail

A rail used in circulation areas such as corridors, passageways, ramps and stairways, to assist in continuous movement.

1.5.11 Hazard

Any object in or immediately adjacent to a direction of travel, which may place people at risk of injury.

1.5.12 Integrated TGSi unit

Manufactured units of the same colour and material, comprising both the raised bars or strips and an underlying surface.

1.5.13 Kerb

A side barrier to a trafficable surface including walkways and ramps.

1.5.14 Kerb ramp

An inclined section of an accessway with length not greater than 1520 mm and gradient not steeper than 1 in 8, provided instead of a kerb.

1.5.15 Height

The distance measured above the finished floor or ground surface.

1.5.16 Luminance-contrast

The amount of light reflected from one surface or component, compared to the amount of light reflected from the background or base surfaces.

1.5.17 Luminance factor

The ratio of luminance of a surface to that of a perfect reflector.

1.5.18 Orientation

A person's awareness of their position and relationship to significant objects in their environment.

1.5.19 Direction of travel

The path a person travels along, which may include a footpath, passageway, walkway, ramp, stairs, landing or similar.

1.5.20 Pedestrian push-button assembly

An enclosure incorporating a push-button switch that is designed for use in conjunction with a signalized intersection or foot crossing for the purpose of registering a pedestrian demand.

NOTE: It could also include, or have associated with it, facilities for the generation of audible signals.

1.5.21 Pedestrian operated signal (POS)

Pedestrian activated traffic signals operated through push-button assemblies.

1.5.22 Ramp

An inclined accessway with a gradient steeper than 1 in 20 but not steeper than 1 in 14.

1.5.23 Step ramp

An inclined section of an accessway with a length not greater than 1520 mm and a gradient not steeper than 1 in 8, provided instead of a step other than a kerb.

1.5.24 Tactile ground surface indicators (TGSIs)

Areas of raised ground surface texture treatment, designed to provide blind or vision-impaired pedestrians with warning and/or directional orientation information.

1.5.25 Tactile indicators

Indicators designed to provide blind or vision-impaired pedestrians with orientation information by means of tactile perception.

1.5.26 Tactile perception

The process of feeling the shape, surface and size of an object.

1.5.27 Vision impairment

Any significant loss of sight.

1.5.28 Walkway

Any accessway with a gradient not steeper than 1 in 20.

1.5.29 Warning indicator

An indicator that is used as a warning of a hazard and the need to stop, consider, investigate and wait before proceeding.

NOTE: For example, at kerb edges, platform edges, and the like.

1.5.30 Width

The distance measured at right angle to the direction of travel.

1.6 INSTALLATION

Installation of TGSIs shall be in accordance with Appendix A.

SECTION 2 CRITERIA AND APPLICATION FOR TACTILE INDICATORS

2.1 GENERAL

The following applies to a tactile indicator under all lighting and weather conditions:

- (a) It shall be detectable by tactile means.
- (b) It shall have luminance-contrast to the base surface as follows:
 - (i) Where the dots and bars are of the same colour as the underlying surface of not less than 30% across its entire area
 - (ii) Where discrete dots and bars of not less than 45%
 - (iii) Where discrete dots and bars are constructed using two colours or materials, the raised surface shall have a section that has 60% luminance contrast for a diameter of 24 mm to 25 mm tested as above.

NOTE: Marked colour contrast may also generally be of benefit.

Luminance contrast shall be tested in accordance with Appendix F.

- (c) It shall, at any time after installation, where application ceases to meet any of the criteria, be deemed to no longer comply and shall be replaced or rectified (see Notes 2 and 3).

NOTES:

- 1 Many people with vision impairment require this contrast to visually detect the indicator.
- 2 Some dyes used in manufacturing TGSIs tend to fade as a result of UV degradation.
- 3 If surrounding pavement or floor is changed, the luminance-contrast criteria should be maintained.
- 4 Correct application will minimise adverse effects on all users of tactile indicators.
- 5 Soiling of all pedestrian surface materials is inevitable. This may cause some temporary colour differences in integrated TGSIs units between the raised surface of dots or the bars and the underlying surface. It is expected that this could be rectified by an appropriate maintenance regime.

2.2 TACTILE GROUND SURFACE INDICATORS (TGSIs)

2.2.1 General

TGSIs shall be installed to alert people who are blind or vision impaired to pending obstacles or hazards on, or changes in direction and location points of, the continuous accessible path of travel, where those hazards or changes could not reasonably be expected or anticipated using existing tactile and environmental cues (including auditory, olfactory and other sensory cues).

TGSIs indicate an approaching change but not what the nature of the change will be. A person's orientation through processing all available tactile and environmental cues will make the information provided by the TGSIs meaningful.

In addition to the requirements of Clause 2.1, the following criteria apply:

- (a) TGSIs shall be laid so that there is no likelihood of the edges lifting.

- (b) A TGSIs along the direction of travel shall have a dimension of 300 mm to 400 mm (see Figure A7). Where TGSIs are placed across the direction of travel, to ensure they are detected, they shall have a dimension of 600 mm to 800 mm, as specified in Appendix A.

- (c) A TGSIs shall be slip-resistance tested.

NOTE: Recommended classifications of slip resistance for specific locations are given in HB 197 based on testing in accordance with AS/NZS 4586.

- (d) TGSIs shall have the top surface of bars or domes no more than 4 mm to 5 mm above the base surface (see Figures 1 and 2).

NOTE: For typical examples of tactile ground surface indicators for bus stops and trams/light rail, see Appendix E.

2.2.2 Materials for use as tactile ground surface indicators (TGSIs)

Where synthetic rubber, ceramic tiles, and masonry surfaces are used for TGSIs, they shall comply with the following Standards:

NOTE: The use of materials not covered in this Clause is not precluded; however, any such material, subject to regulatory approval, should comply with Clauses 2.1 and 2.2.

- (a) AS 1683.4, AS 1683.11, AS 1683.12, AS 1683.15.2, AS 1683.21, AS 1683.23, AS 1683.24 and ASTM D 575, for synthetic rubber.
- (b) ISO 13006, for ceramic tiles.
- (c) AS 4455, for masonry units and segmental pavers.

2.2.3 Warning indicators

2.2.3.1 Application

Where required to be installed by the regulatory authority, warning TGSIs shall be provided as applicable to the following, in accordance with Clauses 2.2.1 and 2.2.2:

- (a) Railway, tramway, light rail platform, bus/tram/light rail stop or passenger ferry wharf.
- (b) Level transition between pedestrian areas and carriageways, where the motorists' vision is limited, other than vehicle access to a sole occupancy, single unit or dwelling.
- (c) Escalators and travelators.
- (d) Step(s).
- (e) Stairs.
- (f) Ramps.
- (g) Kerb ramps.
- (h) Any overhead impediments or hazards other than a doorway, with less than 2000 mm clearance in an accessible open public space with no clearly defined continuous accessible path of travel, e.g., wall-mounted objects such as fire hose reels and drinking fountains.
- (i) Water bodies or other items or features of significant risk, e.g., paved or built river embankments, or rail or tramway level crossings.
- (j) A change in direction of directional indicators.

2.2.3.2 Placement

Warning indicators shall be installed—

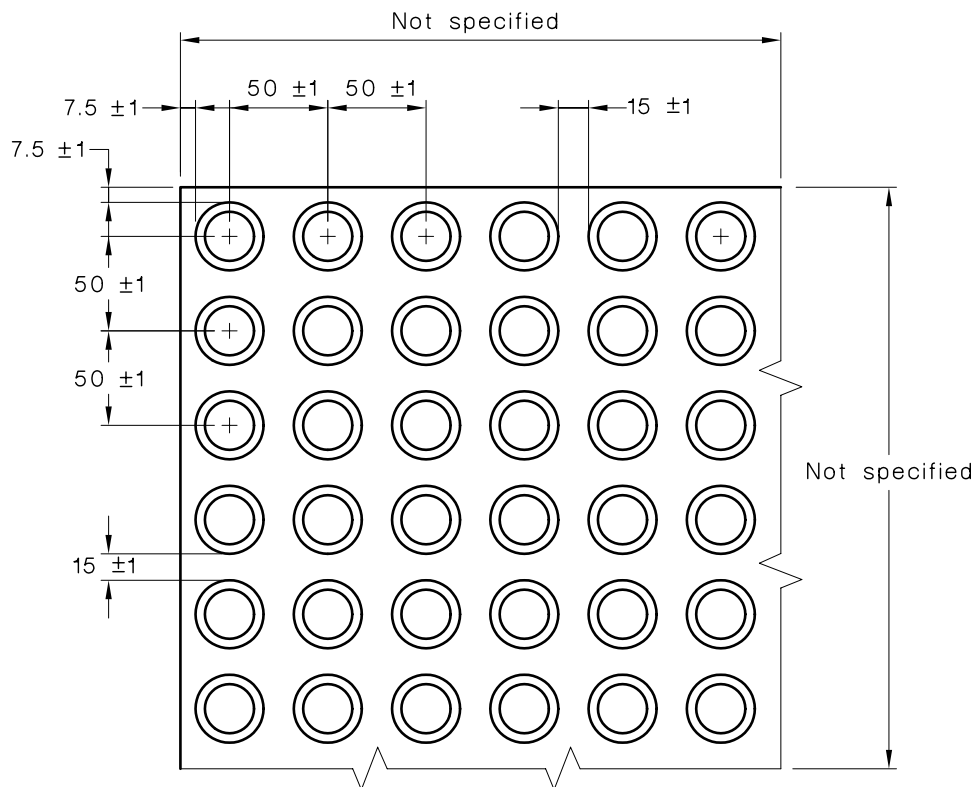
- (a) for the full width of the continuous accessible path of travel;

- (b) perpendicular to the angle of approach to the hazard;
- (c) set back 300 ± 10 mm from the edge of the hazard, except at railway stations or wharves where the set back from the hazard shall be a minimum of 600 mm; and
- (d) on intermediate landings for stairs, stairways and ramps.

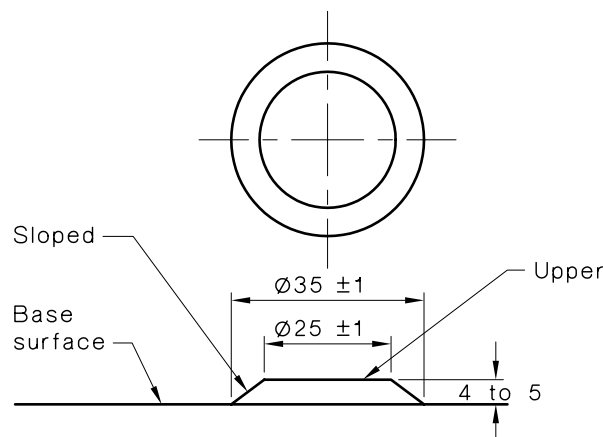
NOTE: TGSIs are not required where both handrails are continuous, e.g., not broken by a doorway or the like.

2.2.3.3 Design requirements

The design of warning indicators shall comply with Figure 1.



(a) Top view



(b) Pattern detail

DIMENSIONS IN MILLIMETRES

FIGURE 1 TYPICAL WARNING INDICATOR PATTERN

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2.2.4 Directional indicators

2.2.4.1 Application

Where required to be installed by the regulatory authority, directional indicators shall be provided as applicable, in accordance with Clauses 2.2.1 and 2.2.2—

- (a) to give directional orientation in open spaces where there are insufficient tactile directional cues, e.g., handrails or walls;

NOTE: A person who is blind or vision impaired may need to negotiate a large internal/external public space, plaza or courtyard to have access to reception, a toilet, a public telephone or other facility for which there are no existing tactile directional cues.

- (b) to designate the route to be taken to avoid a hazard in the absence of existing tactile cues; and
- (c) to give directional orientation where a person must deviate from the regular continuous accessible path of travel to have access to —
 - (i) a mid-block kerb ramp or street crossing;
 - (ii) public transport access point, e.g. bus, tram or light rail stop, train or light rail station or passenger ferry wharf; or
 - (iii) point of entry to a significant public facility, e.g. railway station, public hospital, community health centre, sports or entertainment venue or public toilet.

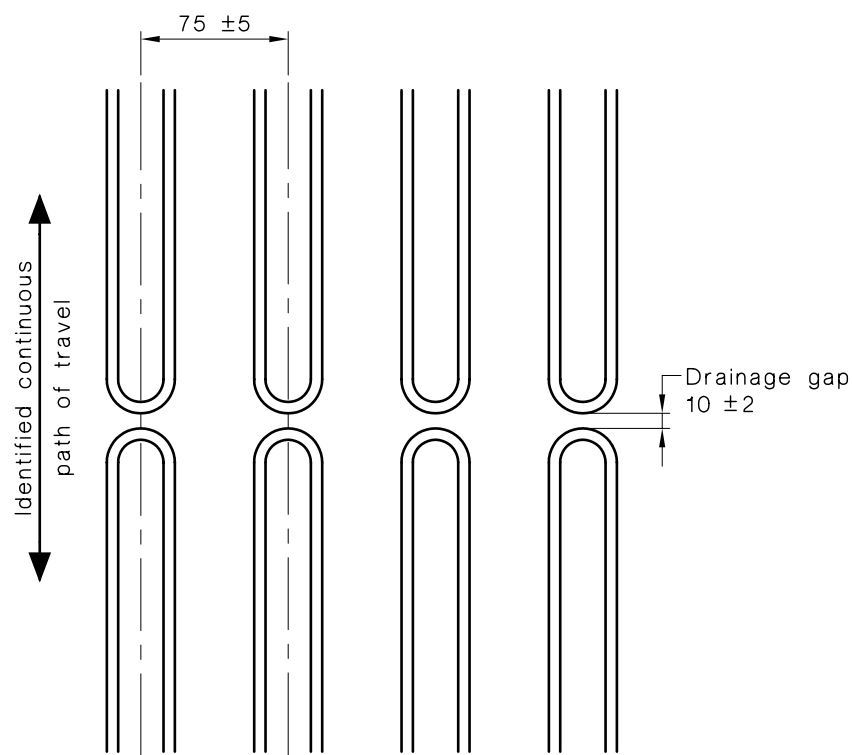
2.2.4.2 Placement

The following applies to the placement of directional indicators:

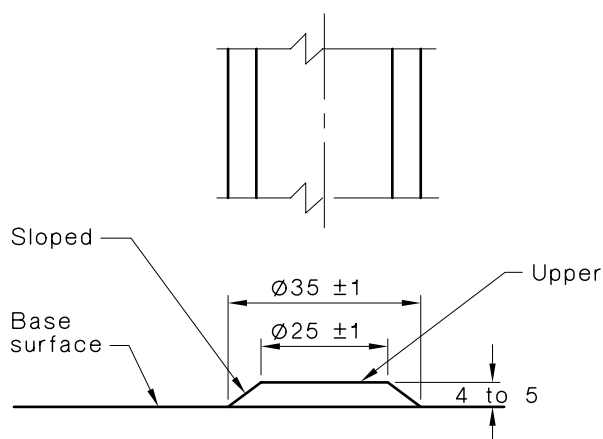
- (a) Directional indicators shall be installed parallel with and along the centre-line of the required direction of travel.
- (b) Where directional indicators indicate the continuous accessible path of travel, they shall be a minimum of 300 mm to 400 mm wide.
- (c) Where directional indicators need to be detected by a person approaching at an angle to the continuous accessible path of travel, they shall be a minimum of 600 mm to 800 mm deep in the direction of approach.
- (d) Drainage gaps shall have a width of 10 ± 2 mm and be located not more than 600 mm apart.

2.2.4.3 Design requirements

The design of directional indicators shall comply with Figure 2.



(a) Top view



(b) Pattern detail

DIMENSIONS IN MILLIMETRES

FIGURE 2 TYPICAL DIRECTIONAL INDICATOR PATTERN

2.3 OTHER ENVIRONMENTAL INDICATORS

Where other indicators are used for tactile guidance, the following applies:

- (a) Handrail indicator buttons shall comply with AS 1428.1.
- (b) Pedestrian push-button assemblies shall comply with AS 2353.

NOTE: For lift control and call buttons see AS 1735.12.

- (c) Handrails with kerbs or kerb rails shall comply with AS 1428.1.

APPENDIX A

INSTALLATION OF TACTILE GROUND SURFACE INDICATORS

(Normative)

A1 GENERAL

This Appendix provides details on the application of TGSIs in various situations.

The following situations are covered:

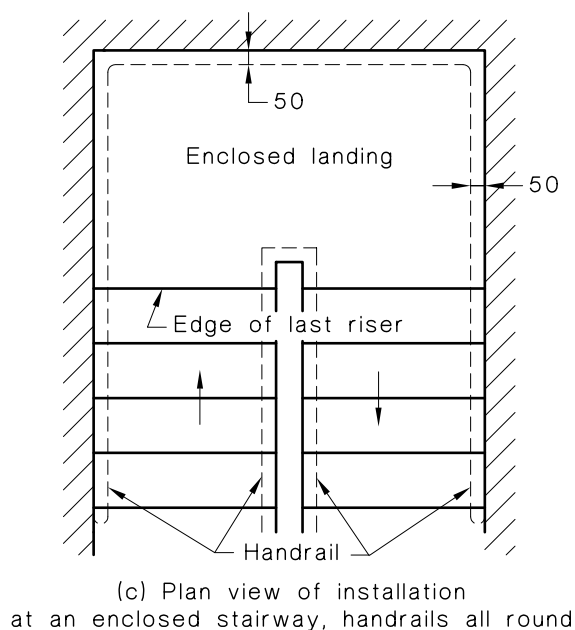
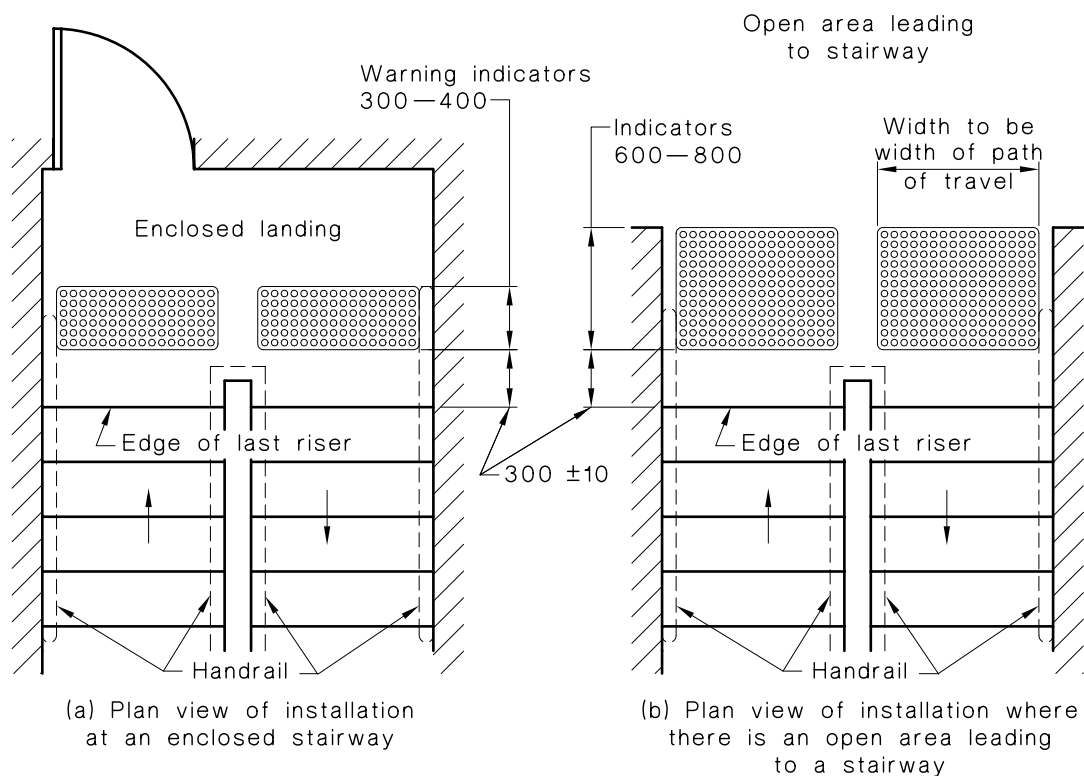
- (a) Stairways, ramps, escalators, and travelators.
- (b) Car park crossings.
- (c) Bus stops.
- (d) Trams/light rail.
- (e) Level path/carriageway junctions.
- (f) Railway platforms.
- (g) Passenger wharves.
- (h) Projecting hazards in circulation spaces.
- (i) Change of direction, directional indicators.

Any required TGSIs application not specifically shown shall comply with the requirements of Section 2.

NOTE: Refer to Appendix E for additional typical examples of TGSIs at bus stops and tram and light rail.

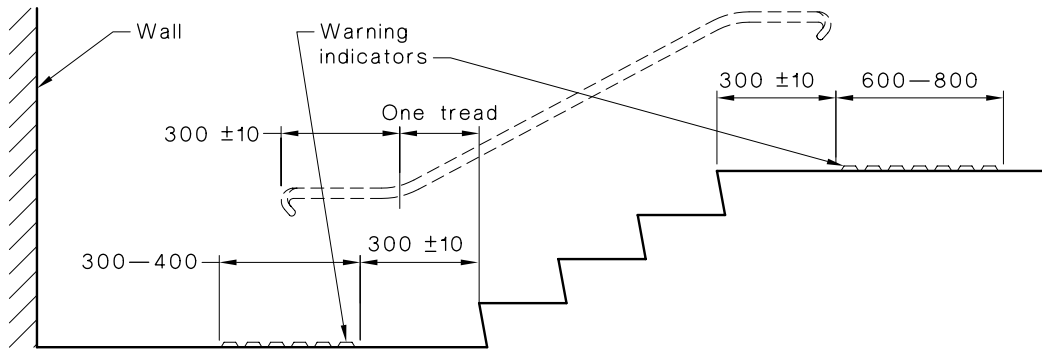
A2 STAIRWAYS, RAMPS, ESCALATORS, AND TRAVELATORS

Where required, warning indicators shall be located at both the top and bottom of stairways, escalators, travelators and ramps, as shown in Figure A1.

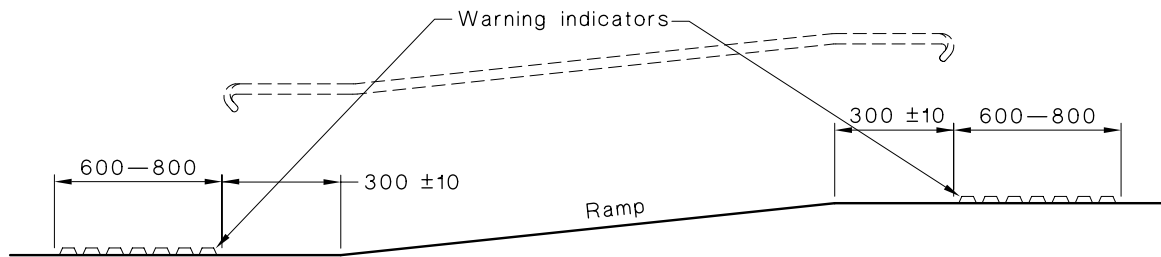


DIMENSIONS IN MILLIMETRES

FIGURE A1 (in part) WARNING INDICATORS AT STAIRWAYS, RAMPS, ESCALATORS, AND TRAVELATORS



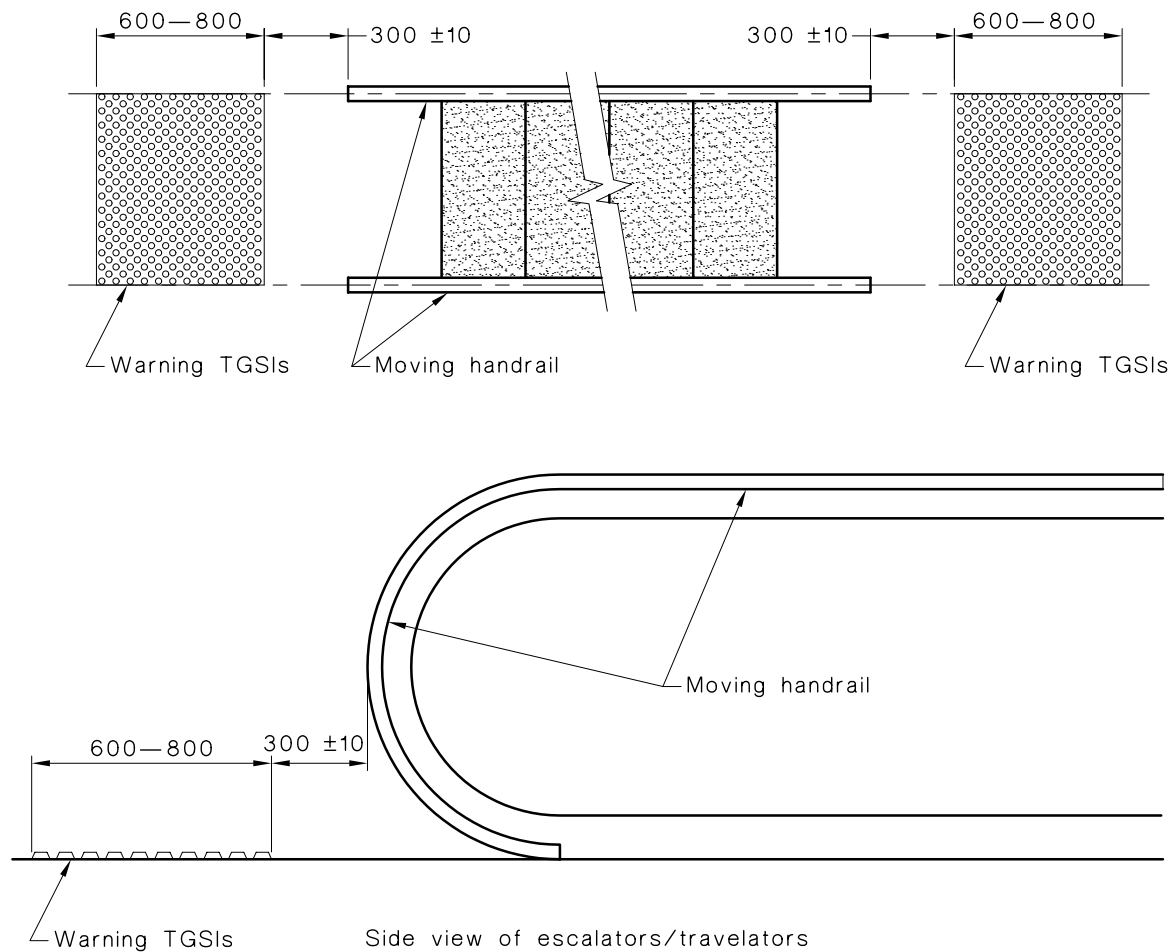
(d) Side elevation where top of stairway or escalator leads to an open area and bottom of stairway is enclosed



(e) Side elevation of installation at a ramp

DIMENSIONS IN MILLIMETRES

FIGURE A1 (in part) WARNING INDICATORS AT STAIRWAYS, RAMPS, ESCALATORS, AND TRAVELATORS



(f) Escalators and travelators

DIMENSIONS IN MILLIMETRES

FIGURE A1 (in part) WARNING INDICATORS AT STAIRWAYS, RAMPS, ESCALATORS, AND TRAVELATORS