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**SANS 10400-S:2011**

Edition 3

# **SOUTH AFRICAN NATIONAL STANDARD**

## **The application of the National Building Regulations**

### **Part S: Facilities for persons with disabilities**

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# **SANS 10400-S:2011**

## **Edition 3**

### **Table of changes**

| <b>Change No.</b> | <b>Date</b> | <b>Scope</b> |
|-------------------|-------------|--------------|
|                   |             |              |

## **Acknowledgement**

The SABS Standards Division wishes to acknowledge the work of the South African Institute of Architects and the South African Institution of Civil Engineering in updating this document.

## **Foreword**

This South African standard was approved by National Committee SABS SC 59Q, *Construction standards – Facilities for persons with disabilities in buildings and the built environment*, in accordance with procedures of the SABS Standards Division, in compliance with annex 3 of the WTO/TBT agreement.

This document was published in April 2011.

This document supersedes the corresponding parts of SABS 0400:1990 (first revision) and SABS 0246:1993 (edition 1).

Compliance with the requirements of this document will be deemed to be compliance with the requirements of part S of the National Building Regulations, issued in terms of the National Building Regulations and Building Standards Act, 1977 (Act No. 103 of 1977).

SANS 10400 consists of the following parts, under the general title *The application of the National Building Regulations*:

*Part A: General principles and requirements.*

*Part B: Structural design.*

*Part C: Dimensions.*

*Part D: Public safety.*

*Part F: Site operations.*

*Part G: Excavations.*

*Part H: Foundations.*

*Part J: Floors.*

*Part K: Walls.*

*Part L: Roofs.*

*Part M: Stairways.*

*Part N: Glazing.*

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### **Foreword** *(concluded)*

*Part O: Lighting and ventilation.*

*Part P: Drainage.*

*Part Q: Non-water-borne means of sanitary disposal.*

*Part R: Stormwater disposal.*

*Part S: Facilities for persons with disabilities.*

*Part T: Fire protection.*

*Part V: Space heating.*

*Part W: Fire installation.*

This document should be read in conjunction with SANS 10400-A. The requirements of this document form part of SANS 10400-D, SANS 10400-M and SANS 10400-T.

Annexes A to D are for information only.

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## **The application of the National Building Regulations**

### **Part S:**

### **Facilities for persons with disabilities**

## **1 Scope**

This part of SANS 10400 provides deemed-to-satisfy requirements for compliance with part S (Facilities for Persons with Disabilities) of the National Building Regulations.

NOTE 1 Part S of the National Building Regulations, issued in terms of the National Building Regulations and Building Standards Act, 1977 (Act No. 103 of 1977), is reproduced in annex A.

NOTE 2 Compliance with the requirements of this part of SANS 10400 does not necessarily ensure compliance with all legislative provisions (see annexes B and C). Other standards may be applicable for dealing with specific matters that are not covered by the National Building Regulations, e.g. ISO 7193 should be used to ensure that workbenches etc. are accessible to wheelchair users.

## **2 Normative references**

The following referenced documents are indispensable for the application 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. Information on currently valid national and international standards can be obtained from the SABS Standards Division.

SANS 784, *Design for access and mobility – Tactile indicators*.

SANS 1186-1, *Symbolic safety signs – Part 1: Standard signs and general requirements*.

SANS 10389-1, *Exterior lighting – Part 1: Artificial lighting of exterior areas for work and safety*.

SANS 10400-A, *The application of the National Building Regulations – Part A: General principles and requirements*.

SANS 10400-D, *The application of the National Building Regulations – Part D: Public safety*.

SANS 10400-M, *The application of the National Building Regulations – Part M: Stairways*.

SANS 10400-O, *The application of the National Building Regulations – Part O: Lighting and ventilation*.

SANS 10400-P, *The application of the National Building Regulations – Part P: Drainage*.

SANS 10400-T, *The application of the National Building Regulations – Part T: Fire protection*.

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### **3 Definitions**

For the purposes of this document, the definitions given in SANS 10400-A (some of which are repeated for convenience) and the following apply.

#### **3.1**

##### **access**

approach, entry or exit

#### **3.2**

##### **accessible**

characteristic of a building, that can be reached, entered and used

NOTE Accessibility is evaluated in terms of the safe, comfortable and convenient use of the site, building or facility by persons with disabilities.

#### **3.3**

##### **accessible building**

building that complies with the requirements of this part of SANS 10400

#### **3.4**

##### **accessible route**

walking space that complies with the requirements of this part of SANS 10400

#### **3.5**

##### **adequate**

adequate

a) in the opinion of any local authority, or

b) in relation to any document issued by the council, in the opinion of the council

#### **3.6**

##### **approved**

approved

a) by any local authority, or

b) by the Review Board on appeal to the Review Board in terms of the Act

#### **3.7**

##### **circulation space**

unobstructed area, for a minimum height of 2,1 m above finished floor level, within and around buildings, elements, fixtures and fittings required for movement into and within buildings

#### **3.8**

##### **clear opening width**

clear open space of an open door through which the user of a building passes

NOTE Clear opening width is not the same as the door width, as it also accounts for the thickness of the door, and any obstructions caused by door furniture on the door, or obstructions such as doorstops fixed to the floor or walls.

#### **3.9**

##### **competent person**

as defined in SANS 10400-A

## **4**

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### **3.10**

#### **competent person (environmental access)**

person who is

- a) registered in terms of the Architectural Profession Act, 2000 (Act No. 44 of 2000), as either a Professional Architect, Professional Senior Architectural Technologist or a Professional Architectural Technologist, and has suitable contextual knowledge and experience to undertake a rational design or rational assessment in terms of the requirements of part S of the Regulations; or
- b) generally recognized as having the necessary experience and qualifications to undertake a rational assessment and advise a Professional Architect, Professional Senior Architectural Technologist or Professional Architectural Technologist registered in terms of the Architectural Profession Act, 2000 (Act No. 44 of 2000), on a rational design in terms of the requirements of part S of the Regulations

### **3.11**

#### **deemed-to-satisfy requirement**

non-mandatory requirement, the compliance with which ensures compliance with a functional regulation

### **3.12**

#### **easy-to-use**

descriptive of a fixture or fitting that has been designed and fitted in such a way that persons with disabilities are able to use it safely, comfortably and conveniently, both in terms of the mechanism used for its operation and the force required to operate it

### **3.13**

#### **emergency route**

that part of an escape route which provides fire protection to the occupants of any building and which leads to an escape door

### **3.14**

#### **entrance**

any access point to a building or portion of a building or facility, used for the purposes of entering

NOTE An entrance includes the approach walk, the vertical access leading to the entrance platform, the entrance platform itself, vestibule if provided, the entry door or gate, and the hardware of the entry door or gate.

### **3.15**

#### **escape door**

door in an escape route which, at ground level, leads directly to a street or public place or to any approved open space which leads to a street or public place

### **3.16**

#### **escape route**

entire path of travel for all persons, including persons with disabilities, from the furthest point in any storey in a building to the nearest escape door and may include an emergency route

### **3.17**

#### **exit door**

door that is a component of an escape route from any room

### **3.18**

#### **flush finish**

finishing of two adjacent surfaces in such a way that they provide no vertical or horizontal gap, gradient or camber that might affect the safe, comfortable and convenient passage of persons with disabilities

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### **3.19**

#### **functional regulation**

regulation that sets out in qualitative terms what is required of a building or building element or building component in respect of a particular characteristic, without specifying the method of construction, dimensions or materials to be used

### **3.20**

#### **grab rail**

rail used as a support to transfer a person on or off a toilet, or to assist with other functions

### **3.21**

#### **handrail**

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

### **3.22**

#### **impaired**

lower than generally accepted optimum performance in a human ability, which might be a temporary or permanent condition

### **3.23**

#### **impairment**

indicative of any one impaired ability

### **3.24**

#### **kerb cut**

link between a road traffic surface and an elevated or lowered pedestrian pavement

### **3.25**

#### **landing**

platform between two consecutive flights of a stairway or ramp

### **3.26**

#### **light reflectance value**

##### **LRV**

measurement, using a spectrophotometer, of the light reflected from a surface in standard conditions

NOTE It is expressed on a scale of 0 to 100, with black being about 5 and white about 90.

### **3.27**

#### **main entrance**

entrance that leads directly to

- a) a reception area or point that provides information about the building or services within it, or
- b) the primary stairway or lift foyer

### **3.28**

#### **means of access**

means of entering a building, site of buildings or building complex, and safe egress from the building, site of buildings or building complex, including the use of all facilities within and around the building, site of buildings or building complex

NOTE The means of access relates to the safety, comfortable and convenient use of both the building, site of buildings or building complex and the facilities within it for persons with disabilities.

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### **3.29**

#### **obstruction**

any of the following:

- a) anything impeding or preventing passage or progress in relation to a building or facility, which denies or removes from persons with disabilities, any supporting or enabling facility for their functioning within the building or facility; or
- b) obstacles that unfairly limit or restrict persons with disabilities from enjoying the opportunities provided within a building or facility on equal terms with persons without disabilities

NOTE The failure to take steps to reasonably accommodate the needs of persons with disabilities within the building or facility can also be seen as a type of obstruction.

### **3.30**

#### **occupancy**

particular use or type of use to which a building or portion thereof is normally put or intended to be put

NOTE Regulation **A20** (see SANS 10400-A) classifies and designates occupancies.

### **3.31**

#### **path of travel**

circulation route or circulation space normally used by persons using the site, building or facility, including all external and internal routes and spaces in common usage, and the entrances and exits within these routes and spaces

### **3.32**

#### **person with disabilities**

person who has long-term physical, mental, intellectual or sensory impairments which, in interaction with various barriers, might hinder his full and effective participation in society on an equal basis with others

### **3.33**

#### **ramp**

internal or external walkway with a slope between 1:20 and 1:12, in the direction of travel

### **3.34**

#### **rational assessment**

assessment by a competent person of the adequacy of the performance of a solution in relation to requirements including as necessary, a process of reasoning, calculation and consideration of accepted analytical principles, based on a combination of deductions from available information, research and data, appropriate testing and service experience

### **3.35**

#### **rational design**

design by a competent person involving a process of reasoning and calculation and which may include a design based on the use of a standard or other suitable document

### **3.36**

#### **sanitary fixture**

receptacle to which water is permanently supplied, and from which waste water or soil water is discharged

### **3.37**

#### **secondary entrance**

entrance that is not the main entrance, and that leads directly to

- a) a reception area or point that provides information about the building or services within it; or
- b) the primary stairway or lift foyer

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### **3.38**

#### **site**

erf, lot, plot, stand or other piece of land on which a building has been, is being or is to be erected

### **3.39**

#### **space**

definable area, such as a room, toilet room, hall, assembly area, entrance, storage room, alcove, courtyard, or lobby

### **3.40**

#### **storey**

that part of a building which is situated between the top of any floor and the top of the floor next above it or, if there is no floor above it, that portion between such floor and the ceiling above it (any open work floor, catwalk or gallery being taken to be part of the storey in which it is situated); and in relation to a building

- a) the ground storey is taken as the storey in which there is situated an entrance to the building from the level of the adjoining ground or, if there is more than one such storey, the lower or lowest of these,
- b) a basement is taken to be any part of the building which is below the level of the ground storey,
- c) an upper storey is taken to be any storey of the building which is above the level of the ground storey, and
- d) the height expressed in storeys is taken to be that number of storeys which includes all storeys other than a basement

### **3.41**

#### **suitable**

capable of fulfilling or having fulfilled the intended function, or fit for its intended purpose

### **3.42**

#### **tactile**

that can be perceived by using the sense of touch

### **3.43**

#### **transfer space**

space required by a wheelchair user to transfer to or from a vehicle, toilet or seat

### **3.44**

#### **turning space**

circulation space in which a wheelchair can turn through 360°

### **3.45**

#### **wheelchair-accessible toilet**

toilet designed to include use by wheelchair users

## **4 Requirements**

NOTE The requirements of this part of SANS 10400 form part of SANS 10400-D, SANS 10400-M and SANS 10400-T.

### **4.1 General**

The functional regulation **S2** contained in part S of the National Building Regulations (see annex A) shall be deemed to be satisfied where

- a) facilities both on the site and within the building are
  - 1) in accordance with the requirements given in this part of SANS 10400;

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2) the subject of a rational design or rational assessment undertaken by a competent person (environmental access);

b) any entrance or route used as part of an escape route in order to comply with the requirements of part T of the National Building Regulations is also accessible to persons with disabilities.

NOTE Regulation **S1** identifies the buildings to which Regulation **S2** applies (see annex A).

### 4.2 Signage

**4.2.1** Facilities that are included in a building specifically for use by persons with disabilities, such as wheelchair-accessible parking spaces, wheelchair-accessible toilets, and platform or stair lifts, shall be indicated by the international symbol for access (see figure 1) and shall comply with 4.2.2 and 4.2.4. The international symbol shall be exhibited

a) at the main entrance of, and at any other suitable position in, a building, and

b) in suitable positions to indicate to persons with disabilities the route to the exit of such facilities.

**4.2.2** The sign used to indicate facilities provided for persons with disabilities shall be the SANS 1186-1 type designation GA 22 (allocated to or accessible to wheelchairs) sign. Such signage shall comply with the requirements of SANS 1186-1 and shall have a symbol height of not less than 110 mm.

**4.2.3** Facilities that are not in accordance with the requirements of this part of SANS 10400 shall not bear the international symbol.

NOTE 1 The symbol is the property of the International Standards Office and its use can only be sanctioned where the minimum requirements of the National Building Regulations have been complied with.

NOTE 2 Signs should be in clear, visible and tactile format to ensure that persons with visual impairments are also fully informed. In buildings where persons with visual impairments work or live, evacuation instructions in large print and Braille should be provided, so that persons with visual impairments can familiarize themselves with escape routes.

**4.2.4** Clear legible signs shall indicate the direction and name of an accessible facility and shall incorporate the international symbol. The height of the lettering shall not be less than 50 mm.

Where the viewing distance is greater than 10 m, the height of the lettering shall be increased accordingly (see table 1).

**Table 1 — Height of lettering in relation to viewing distance**

| Viewing distance<br>m | Height<br>mm |
|-----------------------|--------------|
| 15                    | 50           |
| 25                    | 80           |
| 30                    | 100          |
| 40                    | 140          |
| 50                    | 160          |

To enable persons with impaired vision to read location signs adjacent to doors or directional signs on walls, the signs should be placed at a height of between 1,4 m and 1,7 m above finished floor level.

NOTE Raised letters and symbols, in contrasting light and dark colours, on identification or location signs assist those who are blind or have impaired vision.

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All internal signage to indicate escape routes in case of total blackout shall comply with the requirements of SANS 10400-T.

**4.2.5** For demarcating parking areas for wheelchair users, signs should be not less than 2,0 m vertically above driveway level, so that the sign can be seen whilst driving a car.

**4.2.6** Where electronic aids are installed to assist persons with hearing loss, a suitable sign shall be displayed to indicate such facilities.

**4.2.7** Any mark or sign shall comply with the relevant requirements of SANS 1186-1.



**Figure 1 — Access signs**

### 4.3 Parking

**4.3.1** For employee parking, at least one parking space shall be accessible for persons with disabilities.

**4.3.2** In addition to the requirement of 4.3.1, where provision has been made within a building, or on the site on which such building is erected, for the parking of more than 50 motor vehicles,

- a) at least one parking space per 25 parking spaces (or part thereof) and at least 20 % of the parking spaces at rehabilitation and medical facilities shall be provided for parking of vehicles used by persons with disabilities;
- b) the parking spaces provided for vehicles used by persons with disabilities shall be of a suitable length, shall be at least of the dimensions shown in figure 2, and shall be situated on and accessed from a surface that is not steeper than 1:50;
- c) any parking space provided for vehicles used by persons with disabilities shall be located within 50 m of an accessible entrance;
- d) any parking space provided for vehicles used by persons with disabilities shall be clearly demarcated as being intended for the use of persons with disabilities only;
- e) entry and routing to any parking space designated for persons with disabilities shall be provided with a clear height of at least 2,4 m and shall allow for the entry of vehicles suitable for use by wheelchair users, particularly those that have a hoist to carry the wheelchair on top of the car.

**4.3.3** Parking spaces shall be identified by a vertical sign incorporating the international symbol for access by persons with disabilities, in accordance with 4.2. The international symbol shall also be clearly painted on the road surface (see figure 2) and it shall be 1 000 mm × 1 000 mm.

**NOTE** Road signs for persons with disabilities should be provided in accordance with the latest edition of *The Southern African Development Community Road Traffic Signs Manual (SADC RTSM)* published by the Department of Transport.

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Dimensions in millimetres

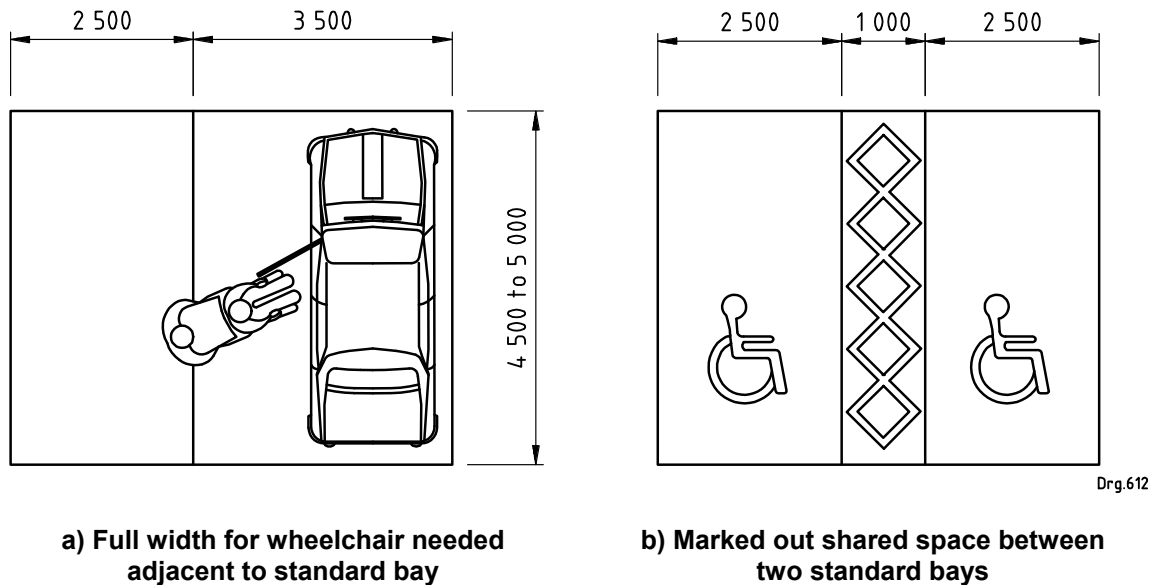


Figure 2 — Accessible parking bays

## 4.4 External and internal circulation

### 4.4.1 General

**4.4.1.1** An accessible route shall form part of an external and internal circulation route.

**NOTE** The space allowances of this part of SANS 10400 should accommodate the use of self-propelled wheelchairs. The minimum dimensions might need to be increased to accommodate the full range of different types of wheelchair.

**4.4.1.2** At least one accessible route shall be provided within the boundary of the site from all public transportation stops, accessible parking spaces, passenger loading zones and public streets and pavements to the accessible building entrance which they serve and the facilities inside the building.

**4.4.1.3** There shall be a means of access suitable for use by persons with disabilities from the outside of the building to the ground storey.

**4.4.1.4** The clear width of the walking surfaces shall not be less than 900 mm (such as between bollards in parking areas, or between planters and seating) and shall not be reduced by protruding objects. If the clear width is less than 1,5 m, an accessible route shall be provided with passing spaces of 1,5 m × 1,5 m (minimum) at intervals not exceeding 5,0 m, or an intersection of two walking surfaces which provide a T-shaped space.

**4.4.1.5** Each accessible entrance to a building shall have at least one door or doorway in accordance with the requirements of 4.6.1.

**4.4.1.6** Revolving doors, revolving gates and turnstiles shall not form part of an accessible route.

**4.4.1.7** Pause areas, with suitable seating, shall be provided adjacent to an accessible route at intervals that do not exceed 25 m.

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### **4.4.2 Turning spaces**

**4.4.2.1** The turning space allowance, e.g. for a wheelchair, guide dog or person on crutches, shall be a minimum of 1,5 m in diameter, inclusive of any toe and knee clearances.

**4.4.2.2** Doors shall not be permitted to swing into the turning spaces.

### **4.4.3 Obstructions in the path of travel**

**4.4.3.1** Protruding objects shall not reduce the clear width required for accessible routes.

**4.4.3.2** Hanging signs, lights, awnings and objects that protrude into circulation spaces shall have a clearance of at least 2 m above the trafficable surface.

**4.4.3.3** Windows and doors shall not open across a walkway, corridor, stair or ramp. Doorstops shall be so positioned that any door will open to its maximum, and that they will not create a hazard.

**4.4.3.4** Wall-mounted fire extinguishers, hose reels, telephones, litter bins and any other wall-mounted fittings shall

a) be designed to be easily seen,

b) be shielded or recessed to prevent injuries, and

c) be accompanied by a feature that warns of the presence of the potential hazard and that is possible to detect by a person using a white cane or stick.

**4.4.3.5** A dished channel shall not be constructed within the boundaries of a path.

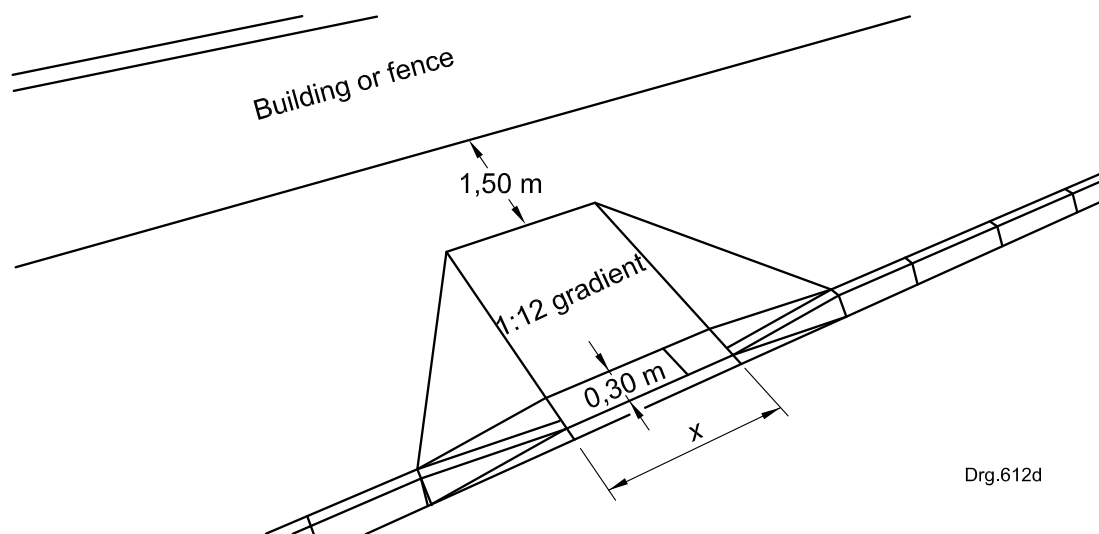
**4.4.3.6** A drainage grating that is within the boundaries of a path shall be set flush with the surface of the path. Such grating shall be placed so that its longitudinal elements are perpendicular to the main walking direction, and the gap between them shall not exceed 13 mm.

**4.4.3.7** Where identified parking for persons with disabilities is provided, a kerb cut that has a slip-resistant finish and gradient that does not exceed 1:12 shall be provided immediately adjacent to the bay (see figure 3).

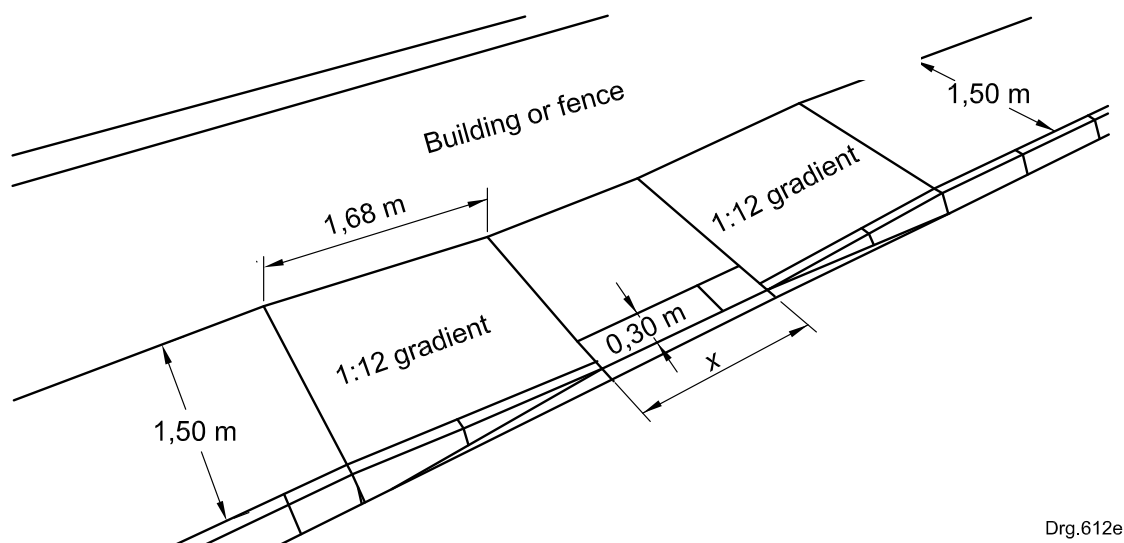
**NOTE 1** Kerb cuts should be provided where required, and in conjunction with pedestrian crossings, taxi and bus ranks and parking garages.

**NOTE 2** The recommended surface between a pavement and roadway is a ramp fitted with tactile guidance surface indicators. This provides a safe and trafficable surface for wheelchair users, and a detectable surface to indicate to persons with visual impairments that they are leaving a pedestrian footpath and entering a traffic roadway.

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**a) Ramp with kerbed sides (wide footpath)**



**b) Ramp with narrow footpath**

Dimension "x" equals width of crossing, unless the kerb cut leads from a parking bay, in which case x shall not be less than 1 400 mm.

A buffer of 300 mm is provided (in accordance with SANS 784) from the edge of the roadway.

**Figure 3 — Kerb cuts**

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### 4.5 Floor or ground surfaces

**4.5.1** Floor and ground surfaces form an integral part of the accessible route throughout the site, both internally and externally, as part of the continuous path of travel. They shall be stable, firm and slip resistant (see SANS 784), under wet and dry conditions.

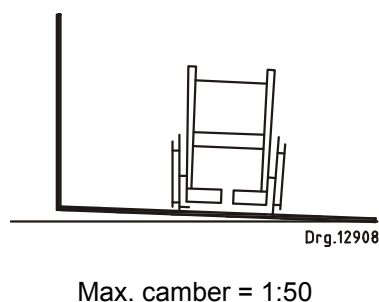
**4.5.2** Carpet, carpet tiles or other floor finishes shall be securely attached and level across all types of pile. Pile height of carpets shall not exceed 3 mm.

**4.5.3** Openings in the floor finish or ground surface shall not exceed 13 mm in diameter and, where the opening is elongated, the long dimension shall be placed perpendicular to the dominant direction of travel.

**4.5.4** The vertical change in level between two floor surfaces, or at thresholds, shall have a flush finish and shall not exceed 5 mm in height.

**4.5.5** Where a surface is cambered for drainage purposes, the camber shall not exceed 1:50 (see figure 4).

**4.5.6** Cobbles (whether fixed or loose), gravel sand and other raised or loose finishes shall not form part of an accessible route.



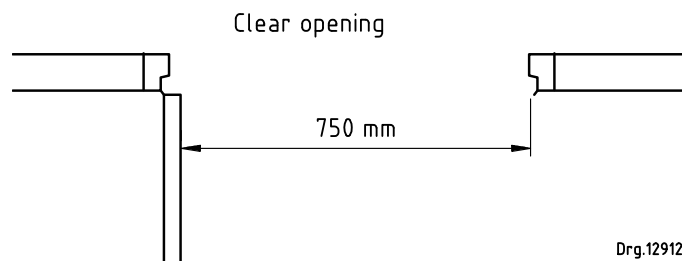
**Figure 4 — Camber on walkways and ramps**

### 4.6 Doorways, doors and door handles

#### 4.6.1 Doorways and doors

**4.6.1.1** Doorways shall allow free access for wheelchair users. The clear opening shall be at least 750 mm when approached along a line that is perpendicular to the opening, as shown in figure 5.

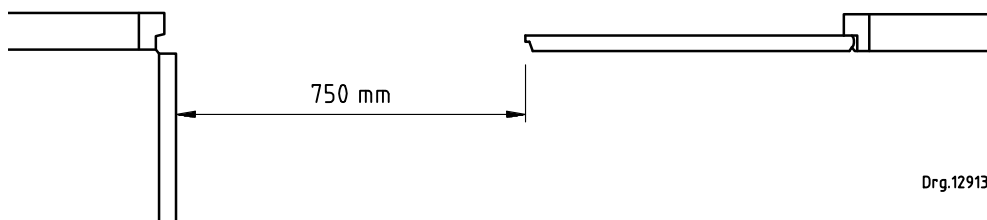
**NOTE** It is recommended that, where possible, the clear opening width should be 800 mm.



**Figure 5 — Clear width of doorway**

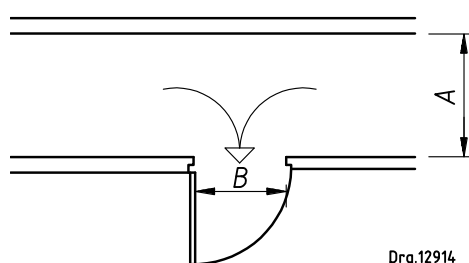
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**4.6.1.2** Where a two-leaf door is used, the clear opening provided by the leading leaf shall be at least 750 mm, as shown in figure 6, when approached along a line perpendicular to the opening.



**Figure 6 — Clear width of leading leaf**

**4.6.1.3** Minimum access dimensions to enable wheelchair users to make 90° turns, shall be as shown in figure 7.

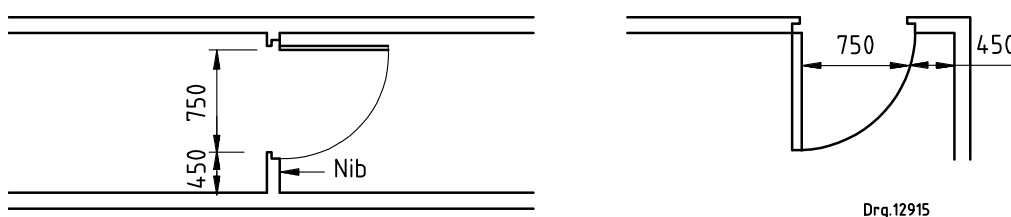


| Passage width<br><b>A</b><br>mm | Door width<br><b>B</b><br>mm |
|---------------------------------|------------------------------|
| 1 200                           | 750                          |
| 1 100                           | 850                          |
| 1 050                           | 900                          |
| 1 000                           | 950                          |
| 950                             | 1 000                        |
| 900                             | 1 050                        |

**Figure 7 — Access dimensions**

**4.6.1.4** Where a person in a wheelchair is required to open a door towards the wheelchair, a nib of at least 450 mm shall be provided at the handle side of the door, as shown in figure 8.

Dimensions in millimetres



**Figure 8 — Doorways in restricted spaces**

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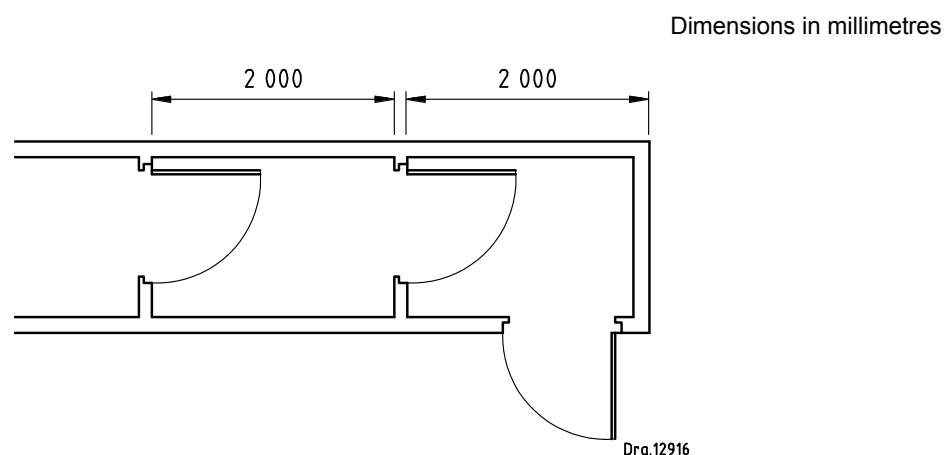
**4.6.1.5** The minimum distance between doors shall be as shown in figures 9 and 10.

**4.6.1.6** Sliding doors may be installed in places where a hinged door would hinder circulation or manoeuvrability.

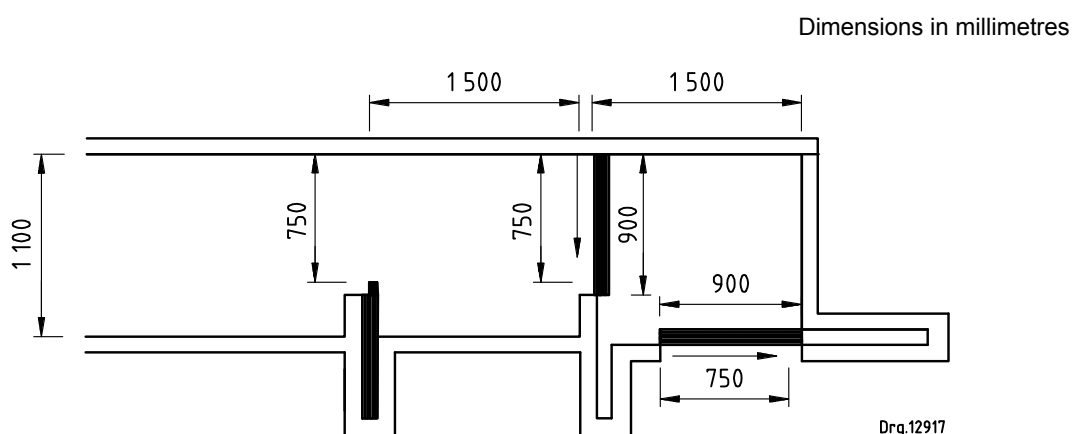
**4.6.1.7** Where revolving doors, turnstiles or other barriers are installed, an alternative means of access shall be installed.

**NOTE 1** Doors are a hindrance and their use should be avoided. Where doors cannot be avoided, for example, in a route used for emergency egress, doors should be held open by a mechanism that is safe, comfortable and convenient for persons with disabilities to operate, such as magnetic closers.

**NOTE 2** Frequently used doors, such as main entrance self-closing doors, should preferably open automatically and be equipped with a fail-safe system that enables the door to open under emergency conditions



**Figure 9 — Minimum distance between hinged doors**



**Figure 10 — Minimum distance between sliding doors**

### 4.6.2 Door handles

**4.6.2.1** A handle fitted to a door leaf of a door in an emergency route or in a feeder route or in any compartment containing toilet facilities for use by persons with disabilities, shall be of the lever type, with a lever at least 150 mm long, and shall be installed at a height that does not exceed 1,0 m above floor level.

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**4.6.2.2** Round door knobs do not provide an adequate grip for persons with impaired dexterity and shall be avoided.

**4.6.2.3** All doors shall be openable with one hand.

**4.6.2.4** All door handles shall be horizontally aligned.

**4.6.2.5** Door furniture with sharp protruding edges is hazardous and shall not be used.

### **4.7 Changes in level**

**4.7.1** In trafficable areas for public use, any changes in level shall comply with the requirements of SANS 10400-D, and with the requirements given in 4.7.2 and 4.7.3.

**4.7.2** A raised kerb, not less than 75 mm high, or a skirting rail not more than 300 mm high, measured vertically above the surface, shall be provided on exposed sides of any ramp, stairway, balcony or any similar area where a change in level occurs.

**4.7.3** Where a change in level of more than 600 mm occurs, a handrail shall also be provided.

### **4.8 Ramps**

NOTE 1 Ramps might be required for use by persons without disabilities, for example, persons pushing trolleys who require ramps as an alternative to stepped access.

NOTE 2 Ramps should only be provided where level access cannot be achieved. Where a ramp is provided, stepped access should normally accompany it for persons with ambulant disabilities who find ramps difficult to use.

**4.8.1** Any ramp or series of ramps shall provide a safe, comfortable and convenient route for wheelchair users.

**4.8.2** Any ramp provided in terms of this part of SANS 10400 shall

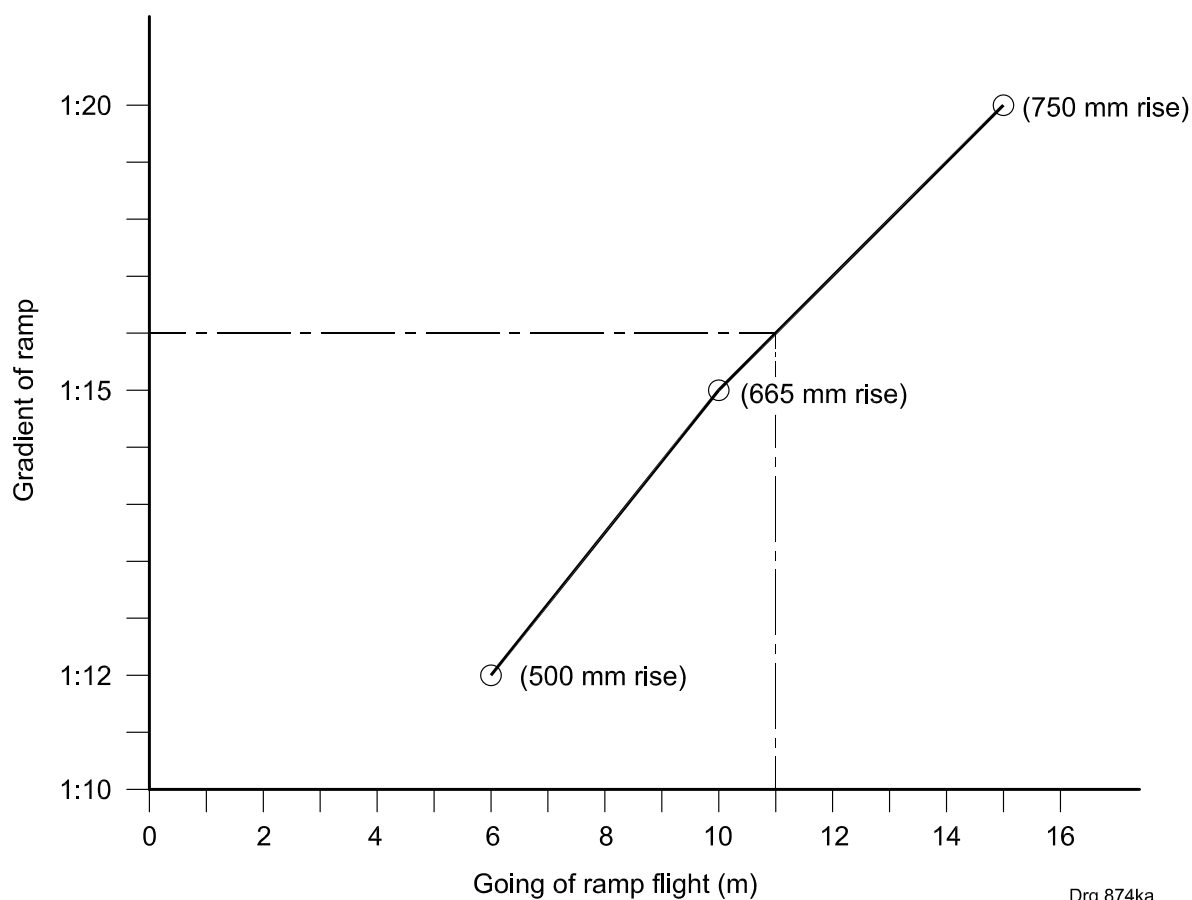
- a) have a gradient, measured along the centre line, that is not steeper than 1:12 ;
- b) have a clear, trafficable surface not less than 1 100 mm wide;
- c) have a surface in accordance with 4.5;
- d) have a landing at the top and bottom of each ramp of not less than 1,2 m in length (clear of any door swing) and of width not less than that of the ramp;
- e) comply with the requirements between landings as given in table 2 and figure 11;
- f) have a handrail on both sides of the ramp or, where the width is greater than 2,4 m, a central handrail in accordance with the requirements of 4.10 where the gradient is steeper than 1:15;
- g) where ramps in the same direction are used for a vertical rise of more than 600 mm, be staggered by the width of the ramp, in order to prevent a long straight line of ramps (see also 4.8.2(d)).

NOTE Where the total rise contemplated for a series of ramps is greater than 2 m, consideration should be given to alternative means of vertical circulation.

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**Table 2 — Ramp requirements between landings**

| 1        | 2                           | 3                                            |
|----------|-----------------------------|----------------------------------------------|
| Gradient | Maximum vertical rise<br>mm | Maximum ramp length<br>between landings<br>m |
| 1:12     | 500                         | 6                                            |
| 1:15     | 665                         | 10                                           |
| 1:20     | 750                         | 15                                           |



**NOTE** For goings between 6 m and 15 m, it is permissible to interpolate between the maximum gradients, e.g. 1:16 for an 11 m going.

**Figure 11 — Allowable gradients of ramps**

**4.8.3** No door leaf or window shall open onto a ramp or landing (see also 4.8.2(d)).

**4.8.4** The camber or banking on walkways and ramps shall not exceed 1:50, as shown in figure 4.

**4.8.5** At any point where the clear height of the area below the soffit is less than 2,1 m, and it is not enclosed, the means of limiting inadvertent access to such area shall be indicated.

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### **4.9 Stairways**

**4.9.1** Stairways shall comply with the requirements of SANS 10400-M, SANS 10400-T and the following requirements:

- a) the width of any stairway, measured to an enclosing wall or balustrade, shall be at least 900 mm;
- b) a landing that serves two flights of stairs in the same straight line shall be of length at least 1 100 mm;
- c) the rise of each tread step shall be of the same height and shall not exceed 170 mm;
- d) solid risers shall be provided in all accessible routes;
- e) a stairway shall be provided with handrails on both sides of the stairway in accordance with the requirements of 4.10;
- f) The maximum height allowed in a flight of stairs, between landings, shall not exceed 1,530 m;
- g) The stairway shall not include any winders (as defined in SANS 10400-M);
- h) No spiral stairway shall form part of an accessible route.

**4.9.2** Nosings shall effectively contrast with their immediate surroundings. The minimum dimensions of each nosing shall be 40 mm × 40 mm.

NOTE Further guidance on contrast and methods of measurement is provided in SANS 784.

**4.9.3** Outdoor stairs and outdoor approaches to stairs shall be so designed that water will not accumulate on walking surfaces.

**4.9.4** Tactile guidance, where provided, shall be in accordance with the relevant provisions of SANS 784.

### **4.10 Handrails**

The design and construction of handrails shall be in accordance with the following:

- a) handrails shall have an elliptical gripping surface profile that is approximately 50 mm wide and 40 mm deep, or a circular profile of diameter not less than 35 mm and not more than 50 mm;
- b) the height to the top of a handrail from the nosing of the tread of the stairs or from the surfaces of a ramp shall be in the range 900 mm to 1 000 mm and shall remain consistent along the length;
- c) handrails shall be securely fixed and shall be rigid;
- d) the surface of the handrail and wall, or any other surface adjacent to them, shall be free of any sharp or abrasive elements;
- e) the clear width between a handrail and an adjacent wall shall be at least 60 mm;
- f) handrails shall extend 300 mm horizontally beyond the top and bottom of the ramp or stairway (see figure 12 and shall return to the supporting structure or shall be finished with a positive return, and the minimum dimensions for landings on escape routes as required in SANS 10400-T shall be maintained;
- g) handrails shall be continuous between landings where this does not create a hazard;

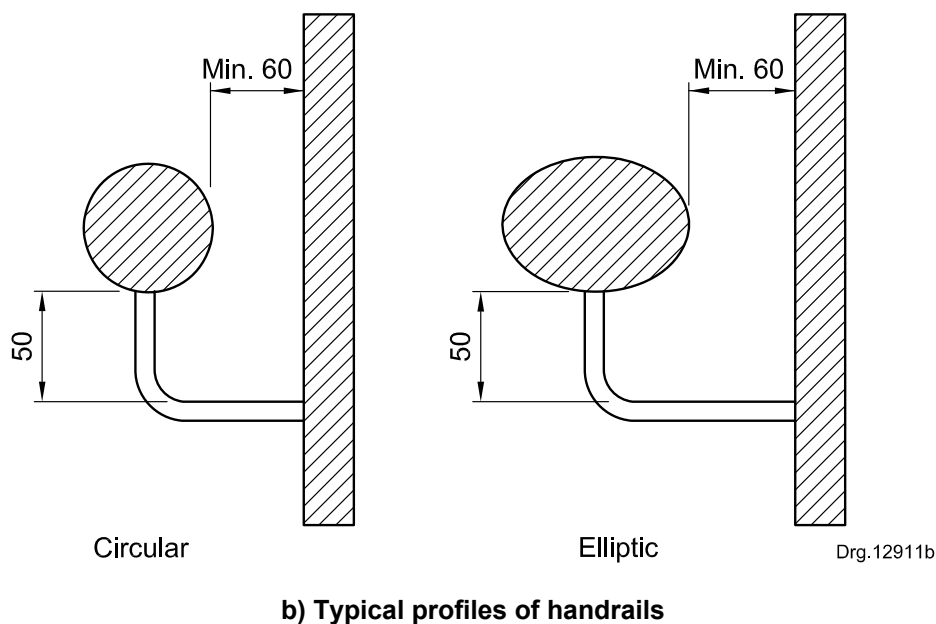
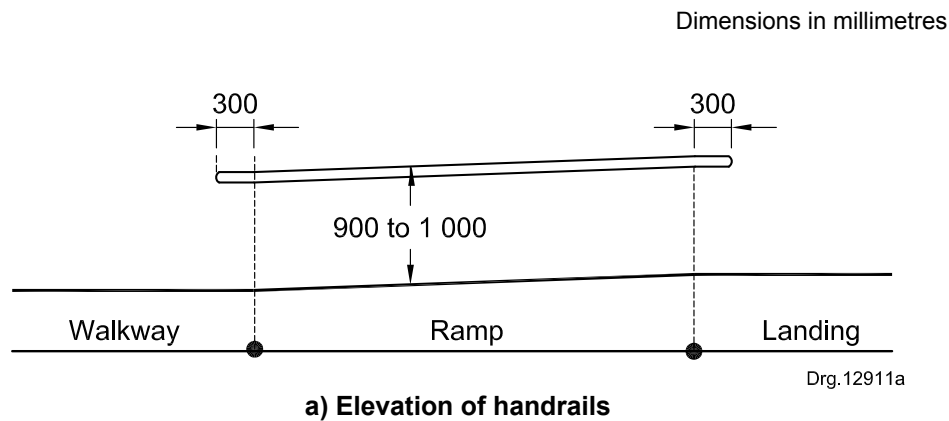
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h) handrails shall be supported centrally from below with not less than 50 mm between the underside of the handrail and the top of the support;

i) where a stairway is wider than 2,4 m, a handrail shall be provided at no more than 2,4 m intervals.

NOTE Handrails that extend at the top and bottom of a stairway are a tactile aid for persons with visual impairments, and a balancing aid for ambulant persons with disabilities.



**Figure 12 — Dimensions of typical handrails**

### 4.11 Lifts

**4.11.1** Lifts include passenger lifts and through-floor lifts, where

- a) passenger lifts serve all the storeys of the building that can be accessed by the stairway, and
- b) through-floor lifts may be used to serve a partial storey (see SANS 10400-A) of area greater than 100 m<sup>2</sup>.

NOTE A through-floor lift can be used in small buildings, as an alternative to a passenger lift.

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### **4.11.2 Passenger lifts shall**

- a) have a minimum internal dimension of 1,1 m in width and 1,4 m in depth, clear of surface finishes;
- b) have a doorway with an unobstructed width of not less than 800 mm;
- c) be fitted with horizontal handrails the full length of the lift car sides at a height of between 850 mm and 1 000 mm above the floor level of the lift;
- d) have a mirror on the top half of the rear wall equal to the width of the lift to enable wheelchair users to back out of the lift where the lift has internal dimensions less than 1,5 m in width and 2,0 m in depth;
- e) have a clear circulation space of not less than 1,5 m × 1,5 m at the entrance of the lift on each floor;
- f) have audible and visible warnings in the lift lobby and lift car to indicate the lift car approaching, the arrival of the lift, the lift doors opening, the lift doors closing, the floor requested and at which floor the lift stops;
- g) have control buttons, including emergency control buttons, that are in accordance with 4.14;
- h) have illuminance on the control panel that is not less than 150 lx;
- i) stop level with the landing on each floor that they serve.

NOTE 1 The provision of the number and size of lifts should take into account the number of persons (persons with disabilities and persons without disabilities) using the site, complex or building. In buildings with large building-user numbers and flow, the size and number of lifts should reflect the fact that a wheelchair user needs to be able to turn when entering or exiting the lift.

NOTE 2 Wheelchair users should not have to travel further than non-wheelchair users to find a means of vertical circulation accessible to them, and they should not have to cross roads or endanger their safety to reach such means.

NOTE 3 To aid persons with visual impairments to operate automatic lifts, tactile identification, both raised numbers on buttons, in contrasting light and dark colours, and Braille lettering adjacent to the number, should be provided at the control panel within the lift car and external to it.

### **4.12 Toilet facilities**

**4.12.1** In any building where facilities for persons with disabilities are required in terms of Regulation **S1** (see annex A), there shall be one or more toilets or unisex toilet facilities suitable for use by wheelchair users, provided that

- a) In any building requiring toilet facilities to which part S of the Regulations applies, the first toilet provided shall be a unisex toilet facility, for use by persons with and without disabilities, preferably in accordance with the details shown in annex D.
- b) In any building of occupancy class H1 where
  - 1) bedrooms are provided with private toilet facilities, at least one such bedroom in every 25 (or part thereof) shall be provided with a toilet, washbasin and bath or shower accessible to persons with disabilities; and
  - 2) bedrooms are not provided with private toilet facilities, on each floor, at least one bathroom for every 25 bedrooms shall be provided with a toilet and a washbasin accessible to persons with disabilities, and at least one bathroom shall be provided with a bath or shower accessible to persons with disabilities, regardless of the number of bedrooms in the hotel, lodging house, hostel or hospitality accommodation.

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- c) In any building other than buildings of occupancy class H1, where in terms of SANS 10400-P, a toilet is required, not fewer than one toilet accessible to persons with disabilities shall be provided within every group of toilets provided.
- d) Persons with disabilities shall not be required to travel further than persons without disabilities to get to a toilet that is accessible to them (see annex B).
- e) Persons with disabilities shall not be required to travel a distance of more than 45 m on the same floor, or 25 m where horizontal and vertical distances are combined, in order to reach a toilet accessible to them, regardless of the number of toilets available to persons without disabilities.

#### **4.12.2** In a wheelchair-accessible toilet,

- a) the door of the compartment that contains the toilet facilities shall open outwards unless a 1,2 m diameter area that is clear of all fittings, fixtures and the line of the door swing is provided. It shall be fitted with a grab rail on the inside and an easy-to-use locking device. The door leaf shall be openable from the outside by the use of a suitable device in the case of an emergency, and such leaf shall be fitted with a suitable means of indicating whether the compartment is occupied;
- b) the minimum finished wall-to-wall dimensions of the compartment shall be not less than 1,8 m × 1,8 m;
- c) a distance of not less than 450 mm and not more than 500 mm shall be provided between the centre line of the toilet and the nearer side wall of such compartment, and suitable grab rails shall be fixed to such side wall and the rear wall;
- d) the distance from the front edge of the toilet to the rear wall of such compartment shall be not less than 690 mm;
- e) the top surface of the seat of the toilet shall be not less than 480 mm and not more than 500 mm above the floor level;
- f) unless the toilet is provided with a special back rest, the lid and seat thereof, when raised to the upright position, shall remain in such position;
- g) sanitary fixtures and fittings, such as the soap dispenser, hand drier, mirror, coat hooks and toilet paper holder shall be easy to use and easily accessible to any person in a wheelchair. Hand-operated metering faucets shall remain open for a minimum of 10 s;
- h) the toilet flushing control shall be positioned on the outer side, on top of or behind the toilet, operable from the transfer space and shall be easy to use;
- i) within any such compartment, the washbasin shall
  - 1) be mounted without legs or pedestal, and the height from the floor to the top edge of such basin shall be not more than 820 mm, and
  - 2) have a vertical clearance of 650 mm from under the basin to the floor, measured at a point not less than 160 mm from the front of and under the basin.
- j) either a vanity slab or shelf shall be fitted in such compartment, level with the top of the washbasin, with a clear height beneath it of 750 mm;
- k) water supply to such a washbasin shall be by way of a single lever mixer unit with a lever handle at least 100 mm long within reach of any person sitting on the toilet;

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- l) grab rail assemblies shall be manufactured and installed so as to meet the purpose for which they are intended. The installation shall be sufficiently sturdy to withstand the loads imposed on them;
- m) grab rails suitable for use by persons with disabilities shall be provided at the side and back of the toilet. The tube of any grab rail shall have an outside diameter between 32 mm and 38 mm. The back and side grab rail may be an integral unit;
- n) In addition to the grab rails indicated in (m), a hinged support arm may be added to the transfer side of the toilet, at 300 mm from the centre of the toilet
- o) doors into accessible toilets shall have a clear opening of 900 mm minimum.

NOTE It is recommended that the maximum temperature of water discharging from any hot water outlet in any building, should not exceed 45 °C. This is of particular importance in ablutions accessible by persons with disabilities.

**4.12.3** Any bath or shower cubicle provided for the use of persons with disabilities shall be so designed that a wheelchair user should be able to roll into such cubicle without being obstructed by a kerb or change of level.

**4.12.4** Floor surfaces to any bath or shower cubicle provided for the use of persons with disabilities shall have a firm and slip-resistant surface under wet and dry conditions.

NOTE Annex D provides further guidance on the design and layout of toilet facilities.

### **4.13 Auditoriums, grandstands and halls**

**4.13.1** Where any building contains one or more auditoriums or halls fitted with fixed seating, floor space accessible to any person in a wheelchair shall be set aside for the accommodation of wheelchairs in such auditoriums or halls. Such space shall

- a) be situated adjacent, or in close proximity, to an exit door and shall be so arranged that a wheelchair will not obstruct any aisle or exit door, and
- b) be of a size sufficient to accommodate
  - 1) a minimum of one wheelchair where the number of fixed seats for which the auditorium or hall is designed is not more than 50,
  - 2) a minimum of two wheelchairs where the number of fixed seats for which the auditorium or hall is designed is more than 50 but not more than 400, and
  - 3) a minimum of three wheelchairs or a number of wheelchairs equal to 0,5 % of the number of fixed seats for which the auditorium or hall is designed, whichever is the greater, where such number of fixed seats is more than 400.

**4.13.2** Wheelchair positions shall be distributed evenly throughout the facility. For each wheelchair position a companion seat shall be provided.

**4.13.3** Each space accessible to a wheelchair shall be not less than 900 mm × 1,4 m. Such a space shall provide a line of vision of the performance comparable to the full range of seating that is not wheelchair accessible.

### **4.14 Controls, switches and power points**

**4.14.1** All security controls and light switches shall be horizontally aligned with door handles and other

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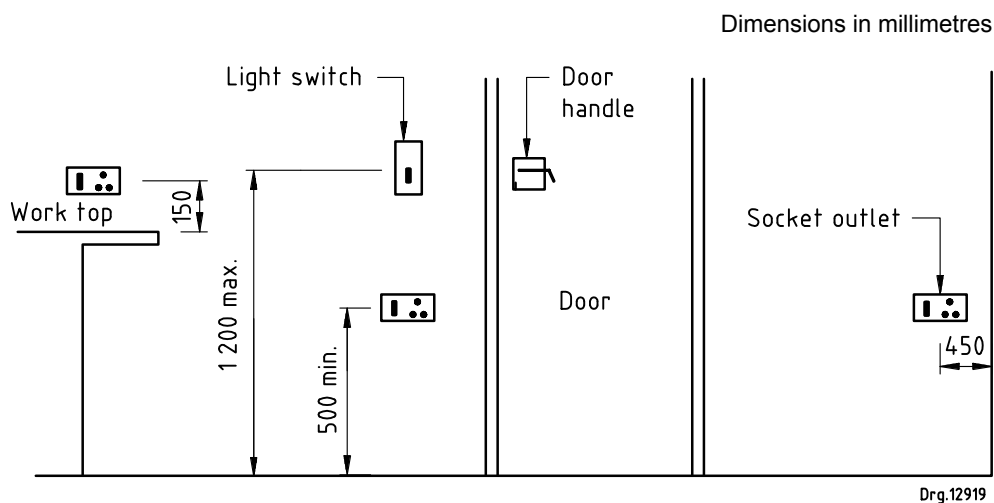
fixtures and fittings (other than socket outlets) between 900 mm and 1,2 m above the finished floor level, as shown in figure 13.

NOTE 1 The recommended height is 1 000 mm.

NOTE 2 For persons with visual or dexterity impairments, rocker action, or push-pad switches that operate in the vertical plane are preferable as long as they are easy to use. Push buttons of light switches should project clear of the switch plate and have a width of at least 15 mm.

**4.14.2** General-purpose socket outlets (power points) shall be fixed at least 500 mm above the finished floor level, 150 mm above the worktop and at least 450 mm from the corners (see figure 13).

**4.14.3** Emergency controls and other controls shall show their effective operation so that they include persons with hearing loss. For example, an emergency alarm in a lift shall light up when pressed.



**Figure 13 — Heights for switches, general-purpose socket outlets and door handles**

## 4.15 Warning signals

All emergency warning signals, including those in mechanical circulation installations, shall be both audible and visible.

NOTE 1 Emergency warning signals include smoke detection, fire alarms and evacuation signals.

## 4.16 Lighting

**4.16.1** The minimum illumination levels of lighting shall comply with the requirements of SANS 10400-O and SANS 10389-1.

NOTE Many persons with disabilities, especially elderly persons and persons with visual impairments, require higher levels of artificial lighting and reduced glare. Persons with hearing impairments might also require a higher level of illumination to facilitate lip-reading.

**4.16.2** Lighting controlled by passive infrared sensors shall be provided in external circulation areas, internal circulation areas, and bathrooms, where these facilities are used after dark. Where passive infrared sensors cannot be provided, night lights shall be provided.

NOTE Contrasting light and dark colours and levels of luminance should be used to assist persons with visual and intellectual impairments.

## **Annex A**

(informative)

### **National Building Regulations Part S: Facilities for Persons with Disabilities**

#### **S1 Application**

- (1) Facilities that accommodate persons with disabilities shall be provided in any building except the following:
- (a) any building of which the whole of the ground storey comprises one or more occupancies classified in terms of regulation **A20** as B1, B2, D4, H4, J1 or J2;
  - (b) any building classified as H1 in terms of regulation **A20** where such building has less than 25 bedrooms and it can be reasonably proven that it is not possible to include wheelchair access in certain aspects of the design; and
  - (c) any storey above ground floor level of a building classified as H3 in terms of regulation **A20** and not provided with a lift.

#### **S2 Facilities to be Provided**

- (1) In any building contemplated in regulation **S1** requiring facilities for persons with disabilities:
- (a) persons with disabilities shall be able to safely enter the building, use all the facilities subject to the provisions of subregulation (3) within it and leave it;
  - (b) there shall be a means of access suitable for use by persons with disabilities, from the main and ancillary approaches of the building to the ground storey; via the main entrance, and any secondary entrance;
  - (c) there shall be a means of egress suitable for use by persons with disabilities from any point in a building to a place of safety in the event of an emergency;
  - (d) any lift installation that is provided shall be capable of serving the needs of persons with disabilities who are likely to be using the building;
  - (e) any commonly used path of travel shall be free of obstacles which limit, restrict or endanger the travel of persons with disabilities, or which prevent persons with disabilities from accessing the facilities provided in the building and the presence of such obstruction shall be made evident in a suitable manner to persons with impaired vision; and
  - (f) a suitable means of access shall be provided to any auditorium or hall situated in any building and such auditorium or hall shall, in relation to its seating capacity, be provided with sufficient open space to accommodate a reasonable number of persons who use wheelchairs or other assistive devices.
- (2) Where parking for more than 50 motor vehicles is provided in or in connection with any building having a means of access contemplated in subregulation (1), adequate parking space shall be provided for the parking of motor vehicles used by persons with disabilities and a suitable means of access shall be provided from the parking area, whether such parking area be inside or outside such building, to the ground storey of such building.

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- (3) Where, in terms of regulation **P1**, toilet facilities are required and the building is one requiring facilities for persons with disabilities in terms of regulation **S1**, an adequate number of such facilities shall be suitable for use by persons with disabilities: Provided that toilet facilities shall not be required in any such building classified as H3 in terms of regulation **A20**.

### **S3 Deemed-to-Satisfy Requirements**

The requirements of regulation **S2** shall be deemed to be satisfied where –

- (a) the facilities provided are in accordance with SANS 10400-S;
- (b) the egress from the building in the event of fire is in accordance with SANS 10400-T.

## **Annex B**

(informative)

### **Access needs of persons with disabilities in the context of the South African legislative framework**

#### **B.1 Introduction**

During the latter half of 1990, the approach to disability shifted from regarding the provision of access for persons with disabilities as an act of kindness, towards the recognition that the creation of environmental barriers is a violation of the civil rights of persons with disabilities.

The provisions for facilities for persons with disabilities contained in the National Building Regulations provide minimum requirements only and do not necessarily comply with the provisions of other legislative requirements.

This annex provides the framework against which building owners, architects and other designers can make decisions about the level of access they should provide. It also provides local authorities with background information to enable them to make decisions in relation to the reasonableness of the access that has been provided, when deciding whether to grant or refuse building approval.

#### **B.2 Approach to providing facilities for persons with disabilities**

For persons with disabilities to be fully functional in society, they should have certain facilities in the buildings in which they live, work or seek recreation. Minimum requirements for such facilities are given in this part of SANS 10400. Every effort should, however, be made to ensure that each site, building and facility can be used to the maximum extent by persons with disabilities. If an area of the site or building or particular facilities cannot be made accessible, then the onus is on the decision-maker, if and when challenged, to prove to persons with disabilities and persons without disabilities that this was a reasonable decision to make.

Every effort should be made to provide accessible facilities in as many buildings as possible, notwithstanding the fact that it might not always be a requirement of the National Building Regulations. The potential to adapt buildings after construction might be prohibitive in terms of cost, and therefore any decision made to include an inaccessible area of a site or building or facility at the design stage, when such works are feasible, should not be taken lightly. A factor to be considered is that all facilities, if designed correctly, can also provide safe, comfortable and convenient use to persons without disabilities.

#### **B.3 Legislative provisions in acts other than the National Building Regulations and Building Standards Act**

##### **B.3.1 The Constitution of the Republic of South Africa**

The Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996) gives a clear framework in which access for persons with disabilities is to be viewed. The three main themes in the Bill of Rights (chapter 2) in this regard are:

##### ***Equality (Section 9)***

*(3) The state may not unfairly discriminate directly or indirectly against anyone on one or more grounds, including race, gender, sex, pregnancy, marital status, ethnic or social origin, colour, sexual orientation, age, **disability**, religion, conscience, belief, culture, language and birth.*

*(4) No person may unfairly discriminate directly or indirectly against anyone on one or more grounds in terms of subsection (3). National legislation must be enacted to prevent or prohibit unfair discrimination.*

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### ***Human Dignity*** (Section 10)

*Everyone has inherent dignity and the right to have their dignity respected and protected.*

### ***Environment*** (Section 24)

*Everyone has the right to an environment that is not harmful to their health or well-being.*

## **B.3.2 The Employment Equity Act**

The stated purpose of the Employment Equity Act, 1998 (Act No. 55 of 1998) is to

*achieve equity in the workplace by –*

- (a) promoting equal opportunity and fair treatment in employment through the elimination of unfair discrimination; and*
- (b) implementing affirmative action measures to redress the disadvantages in employment experienced by designated groups, in order to ensure their equitable representation in all occupational categories and levels in the workforce.*

Persons with disabilities are included in the definition of “designated groups” in the Act.

Section 15(2) states that

*(2) Affirmative action measures implemented by a designated employer must include –*

- (a) measures to identify and eliminate employment barriers, including unfair discrimination, which adversely affect people from designated groups;*
- (b) measures designed to further diversity in the workplace based on equal dignity and respect of all people;*
- (c) making reasonable accommodation for people from designated groups in order to ensure that they enjoy equal opportunities and are equitably represented in the workforce of a designated employer.*

Section 11 places the burden of proof on the employer to establish that an allegation of unfair discrimination is fair.

Section 54(1) enables the Minister of Labour to issue codes of good practice to provide employers with information that can assist them in implementing the Act.

The *Code of good practice: Key aspects on the employment of people with disabilities* asserts that reasonable accommodation to eliminate barriers in the workplace to persons with disabilities include

- adapting existing facilities to make them accessible
- adapting existing equipment or acquiring new equipment
- re-organizing workstations

## **B.3.3 The Occupational Health and Safety Act**

The Occupational Health and Safety Act, 1993 (Act No. 85 of 1993) affects all employers, persons in employment, and persons not in employment but who are affected by the employer's undertakings. This includes persons with disabilities visiting the workplace as well as employees with disabilities.

An employer's responsibilities in terms of section 8(1) are to

*provide and maintain, as far as is reasonably practicable, a working environment that is safe and without risk to the health of his employees.*

An employer or self-employed person shall, in terms of section 9(1)

*conduct his undertaking in such a manner as to ensure, as far as is reasonably practicable, that persons other than those in his employment who may be directly affected by his activities are not thereby exposed to hazards to their health or safety.*

### **B.3.4 The Promotion of Equality and Prevention of Unfair Discrimination Act**

The Promotion of Equality and Prevention of Unfair Discrimination Act, 2000 (Act No. 4 of 2000) addresses the wider aspect within which sites, complexes and buildings should be made usable by persons with disabilities.

Section 9 states that

*no person may unfairly discriminate against any person on the ground of disability, including –*

- (a) denying or removing from any person who has a disability, any supporting or enabling facility necessary for their functioning in society;*
- (b) contravening the code of practice or regulations of the South African Bureau of Standards that govern environmental accessibility;*
- (c) failing to eliminate obstacles that unfairly limit or restrict persons with disabilities from enjoying equal opportunities or failing to take steps to reasonably accommodate the needs of such persons.*

Discrimination as defined by the Act means

*any act or omission, including a policy, law, rule, practice, condition or situation which directly or indirectly –*

- (a) imposes burdens, obligations or disadvantages on; or*
  - (b) withholds benefits, opportunities or advantages from,*
- any person on one or more of the prohibited grounds.*

The Act defines prohibited grounds as

- (a) race, gender, sex, pregnancy, marital status, ethnic or social origin, colour, sexual orientation, age, **disability**, religion, conscience, belief, culture, language and birth; or*
- (b) any other ground where discrimination based on that other ground –*
  - (i) causes or perpetuates systemic disadvantage;*
  - (ii) undermines human dignity; or*
  - (iii) adversely affects the equal enjoyment of a person's rights and freedoms in a serious manner that is comparable to discrimination on a ground in paragraph (a).*

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Section 13 states that

*if the complainant makes out a prima facie case of discrimination:*

- (a) the respondent must prove, on the facts before the court, that the discrimination did not take place as alleged; or*
- (b) the respondent must prove that the conduct is not based on one or more of the prohibited grounds.*

## **Annex C**

(informative)

### **Access needs of persons with different disabilities**

#### **C.1 Introduction**

The individual anthropometric and ergonomic requirements of persons with disabilities vary enormously. Designers of buildings and local authorities who are responsible for approving alternative proposals should appreciate the environmental impact for, or access needs of, persons with commonly accepted categories of disability. The information provided below is given as guidance and is not exhaustive.

#### **C.2 Vision**

##### **C.2.1 General considerations**

Few persons are totally blind; most persons, even if legally blind, can perceive light and darkness, and often some colours. The largest group of visually-impaired persons consists of those who have vision just short of normal vision, to just short of light/dark-only perception. The main issues are to enable the person to make the most of the sight that he does have by keeping in mind the value of size, lighting colour and contrast, whilst also assisting those persons who are totally blind, and also to provide a safe environment where the risk of injury is minimized.

For persons with impaired vision there are four main areas of consideration (see C.2.2 to C.2.5).

##### **C.2.2 Navigation**

Persons with visual impairments are likely to make use of white canes as navigational aids to detect hazards in the built environment. They might also use guide dogs to guide them past obstacles. The cane will detect objects up to approximately 1,0 m high. Persons with low vision will benefit from the correct use of size, lighting, colour and contrast, since the majority of these do not use white canes.

Obstacles above waist height or overhanging items which do not have contact with the ground, as well as windows that open onto pathways, will not be detected by a cane, therefore care should be taken to avoid such hazards.

Information boards and advertisements along pedestrian routes should not be mounted on poles or stands in such a way that a blind person's cane passes underneath it. If something that extends at least 300 mm above the ground is not placed beneath such boards or advertisements, this can cause serious injury to a blind person's face.

Uneven surfaces, steps with irregular risers or open risers on flights of stairs are likely to cause persons with visual impairments to trip and injure themselves. Quality of workmanship is extremely important in avoiding gaps between surface finishes, raised thresholds, and to ensure that all steps have uniform risers.

Environments should be well managed to avoid hazards developing, such as those caused by the disintegration of a surface, or vegetation growing over a pathway. Consistency should be maintained, as once a visually impaired person becomes familiar with a certain environment, he will find it easier to navigate if the environment does not change.

The features required by persons with visual impairments benefit the general safety of the total building population.

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### **C.2.3 Orientation**

The built environment can either create confusion or facilitate orientation. External pathways can be designed to lead directly to the front entrance of a building, and a logical layout with good lighting, colour and contrast can be provided so that it is easy for someone with impaired sight to learn and remember. The majority of visually-impaired persons have low vision, which is not obvious as they will not be using a white cane or guide dog, but try to navigate and orientate themselves by using their level of vision.

### **C.2.4 Visual information**

By creating clarity in the built environment, a level of safety that helps to minimize the risk of injury to persons with visual impairments can be achieved.

An object should be so designed that if it is knocked over by a person, he will not injure himself. Rounded objects rather than sharp-cornered objects should be used.

Glare introduces debilitating effects to a person with a visual impairment. To avoid glare, attention should be paid to the location of windows, the location and level of artificial light, the location of mirrors, and the specification of reflective surfaces, fixtures and fittings.

Lighting should be achieved in such a way that it does not cause confusing shadows, pools of darkness or over-brightness. Even, defuse lighting should be achieved.

Patterns should be utilized with care, to avoid visual confusion. It is difficult for persons with visual impairments to locate a desired object against a patterned background. Patterns can be used to enhance environments, for example, to direct persons towards the reception area or towards fire escapes.

Colour, tone and luminance contrast should be used to aid the identification of critical surfaces. Externally, critical surfaces include guiding walls, steps, rails and textured guidance surfaces. Internally, critical surfaces that require an effective LRV level are ceilings, walls, floors, stairways, doors and significant fixtures and fittings.

Landmarks can be used as guiding features, both internally and externally.

Signage should be designed so that it is easy to see in terms of its positioning, its size and type of font, lighting and colour and There should be a clear link between information signs, directional signs, identification signs and safety signs.

However, both landmarks and signage should complement environmental layout, and not be used to compensate for illogical and confusing spaces.

### **C.2.5 Non-visual information**

Tactile cues can act positively as a navigational aid, and are often used as warning signs underfoot, such as to warn of the presence of a road crossing, or directional aids to guide a person through a wide open space. Textured walls, sculptures and Tactile Ground Surface Indicators (TGSIs) can be used to aid a person to find his way, as can audible signals and olfactory signs. The smell or sound at particular points along a route can help with navigation. Persons who are particularly sensitive to sound can use the echoes created between different surfaces to inform themselves about the nature of the space they are occupying.

## **C.3 Cognition and perception**

### **C.3.1 General considerations**

Persons with cognitive impairments, for example, persons who have neurological impairments and persons with intellectual impairments, experience difficulties with cognition and perception. Learning difficulties, such as dyslexia, also have an environmental problem element.

### **C.3.2 Navigation**

Problems with perception can result in an increased likelihood of tripping and falling, and an increased tendency to bump into objects. Navigational factors that impact on persons with visual impairments therefore apply equally here (see C.2.2).

### **C.3.3 Orientation**

Difficulties with perception or cognition can lead to problems with orientation. The factors affecting persons with visual impairments apply equally here (see C.2.3).

### **C.3.4 Comprehension**

The use of symbols to aid comprehension, either to reinforce written information, or as its own universal language, is recognized internationally.

Information on controls in the built environment should be easy to understand and the use of identical control devices for different functions should be avoided.

### **C.3.5 Visual information**

Clarity and the use of contrasting light and dark colours in the visual environment assist persons with cognitive impairments. Colour contrast, as well as light reflectance value (LRV) contrast, also assists with this. The factors that affect persons with visual impairments therefore apply equally here (see C.2.4).

### **C.3.6 Non-visual information**

Non-visual information can be used to reinforce visual and written information. The factors that affect persons with visual impairments therefore apply equally here (see C.2.5).

## **C.4 Hearing**

### **C.4.1 General considerations**

The main concern is to enable persons with hearing loss to make use of their residual hearing. Provision should also be made for persons who are completely deaf.

### **C.4.2 Superfluous environmental sound**

Persons with impaired hearing have particular difficulty in comprehending sounds and words in noisy environments. Whilst a certain level of background noise might be unavoidable, it can often be 'designed out', for example, by not positioning a meeting room near a busy road, or by introducing a buffer zone between a meeting area and extraneous noise.

### **C.4.3 Signal to noise ratio**

Internally, rooms should be effectively insulated, removing resonance without causing 'dead' sound. An effective communication environment will enable the user of the building to select the desired acoustic signal over any background noise (i.e. provide an effective signal to noise ratio) anywhere in a room.

Care should be taken to ensure that noise from equipment used within the space does not interfere with the desired acoustic signal.

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Persons who are completely deaf are still sensitive to vibrations. This can be used positively, for example, with the use of acoustic flooring.

Deaf persons will find very noisy environments uncomfortable due to the reverberations that they sense.

#### **C.4.4 Safety and clarity in the visual environment**

Persons with impaired hearing or who are completely deaf are not able to use their hearing to warn them of danger. Therefore the visual and tactile environment should be enhanced for their safety.

The factors that create clarity in the environment for persons with visual impairments, also create a safer environment for persons with hearing impairments, and assist with lip-reading and the observation of sign language interpreters.

Persons with impaired hearing are likely to be more reliant on their sight to compensate for their hearing loss. Therefore effective lines of sight should be maintained. For example, persons with a hearing impairment should be positioned so that they can see a door during a meeting, or when sitting at their workstation, so that they are aware of who is entering and exiting.

#### **C.4.5 Communication points and aids**

Key areas where communication is vital need additional attention, such as reception points and classrooms. Communication equipment, such as infrared sound reinforcement or induction loops, might be necessary. However, a great deal can be achieved without the introduction of communication aids by creating a well-designed acoustic environment.

When employing a sign language interpreter, lighting and other conditions within the visual environment should be carefully planned so that the interpreter can be easily understood.

The use of visual or vibrating alarms integrated with audio-alarm systems, such as fire alarms, shall receive particular attention in the building design phase.

### **C.5 Balance**

Impaired balance can be caused by sensory loss or by motor dysfunction, therefore, care should be taken in the built environment to avoid injury to children and adults with impaired balance.

Surfaces should be slip-resistant, friction-free and even, since persons with impaired balance are prone to tripping and falling.

All steps, stairs and ramps should be fitted with handrails on both sides to reduce the risk of falling. Protection should be provided from standing water and changes in level where someone could fall and injure themselves.

Objects should be designed so that they do not cause injury on impact. Visual clarity and enhancement using other senses will reduce the risk of injury for persons with impaired balance, as well as for persons with visual impairments.

### **C.6 Touch**

Impairments of sensation can be dangerous when contact with hot or very cold surfaces is likely. Protection from hot pipes in toilets should be provided. Persons who have had a spinal injury often lose sensation in their lower limbs, and can be burnt on pipework from taps, or from the heat from the underside of a metal sink.

Persons with certain cognitive impairments might not react to burning, thus causing themselves injury.

Protection from hot surfaces, but also a control on the maximum temperature of hot water should be considered.

Persons with certain neurological conditions cannot feel when they have come into contact with a sharp object; therefore object design is important.

## **C.7 Terminal conditions**

### **C.7.1 General considerations**

Terminal conditions, such as HIV/AIDS, cancer or late-stage diabetes, might well result in incontinence and fatigue.

### **C.7.2 Incontinence**

A range of factors are related to incontinence, from the need to go to the toilet, to the expected travel distance to get to a toilet, and the toilet design. Many AIDS-related or other terminal illness conditions cause incontinence, and therefore proximity to a toilet becomes very important. Incontinence is acutely embarrassing and is often neglected in relation to building design and layout.

### **C.7.3 Fatigue and operational force**

Persons with various conditions are prone to fatigue, which can affect their ability to move around or operate environmental elements.

Distances between facilities, negotiating public transport and steps and stairs can cause problems for persons who are predisposed to fatigue, whether or not they have mobility aids. This is a particular problem for persons who have AIDS. The planning of facilities on the site should take this into account, and resting facilities should be provided en route.

Predisposition to fatigue could make repetitive tasks or standing difficult, and the operation of doors, windows, taps, handles, levers, switches, push-buttons, keys, etc. could pose problems. This can be made easier by selecting operational levers that are easy to use and that require minimal force to operate. Hands-free or electrically operated fixtures are preferable.

## **C.8 Height**

### **C.8.1 General**

Persons who are short in stature experience problems within the built environment that might not be catered for by accommodating wheelchair users. Specific problem areas (not including reach (see C.9.2) and fatigue (see C.7.3)) commonly experienced by persons of short stature are covered in C.8.2 to C.8.4.

### **C.8.2 Height of switches and appliances**

Even if their reach is not affected, some items might be positioned too high for persons of short stature.

### **C.8.3 Sight lines**

A person with short stature will be at risk moving through doorways with high vision panels, and also when trying to see in an auditorium. This obviously also affects persons in wheelchairs.

### **C.8.4 Sitting posture**

A short person will have difficulty sitting comfortably if chairs are too high and table heights are not adjustable. Providing footrests accommodates the person to some extent, but might restrict movement.

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### **C.9 Reach, dexterity and manipulation**

#### **C.9.1 General considerations**

Reach, dexterity and manipulation all affect persons with upper limb impairments and persons in wheelchairs.

#### **C.9.2 Reach**

Persons with limited forward or side reach have difficulty operating levers and equipment. Children and adults without disabilities who are short in stature are also affected. For wheelchair users, the provision of knee space under surfaces is crucial to effective reach. When carrying out operational tasks, side reach is not an effective compromise to front reach with the provision of knee space.

Persons operate within two reach ranges: comfortable and extended. Care should be taken to place equipment and fittings used frequently within universally comfortable reach. Where this is not possible, alternative methods of operation or individual modification might be necessary.

#### **C.9.3 Dexterity and manipulation**

The manual operation of handles, taps, levers, switches, locks, control mechanisms and keys is in part affected by their design. The selection of controls requiring a 'twist-action' of the wrist and hand, and fine-finger movements should be avoided.

### **C.10 Circulation**

#### **C.10.1 General considerations**

Persons who have mobility impairments might use various assistive devices, either manual or electric wheelchairs, or wheelchairs pushed by a helper. Persons with ambulant disabilities might use crutches, walking stick(s) or walking frames.

#### **C.10.2 Space for the assistive device**

The largest assistive device tends to be a wheelchair. If this is accommodated, other assistive devices will also be accommodated in the same space. However, there are a variety of different types of wheelchairs issued in accordance with the anthropometric measurements by a rehabilitation clinic of the individual and the nature and extent of his disability.

A wheelchair cannot be designed effectively without considering the person in the wheelchair as well. In addition, wheelchair users vary in their ability to manoeuvre a wheelchair. This is particularly true when turning, operating doors and when moving up a ramp.

The Regulations do not necessarily take all these factors into account. Therefore, whilst general assessment can address most of the problems that affect wheelchair users, individual workplace assessment that takes into account the individual's anthropometric and ergonomic requirements is likely to be necessary.

#### **C.10.3 Surface type**

Both persons who use wheelchairs and those who use other assistive devices require a level surface on which to move. Wheelchair users can manoeuvre with much greater accuracy if the surface is relatively flat and free of irregularities. However, it shall also be slip resistant. Slippery surfaces are very difficult to negotiate on ramps, where wheelspin can occur, and when manoeuvring through a doorway.

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Persons that use crutches, walking sticks or walking frames are in danger of tripping or slipping on uneven or cobbled surfaces. Handrails should be provided on both sides of a stairway, to assist persons going up or down. Many persons with ambulant disabilities find stairs easier to negotiate than a ramp, since the travel distance is shorter.

### **C.10.4 Drainage surfaces**

Adequate water drainage from a level surface should be provided, which can be achieved with a gradient of 1:50 to 1:60. Drainage surfaces and channels are particularly important in the design of level thresholds into buildings.

### **C.10.5 Vertical circulation**

Level access should always be the primary consideration when entering a building. Where ramps are used, at the entrance or inside, the minimum gradient possible should always be the aim, bearing in mind the need to have level landings to allow a wheelchair user to rest. Such level landings should be clear of the swing of any door, whether opening outward or inward.

### **C.10.6 Single steps, thresholds or gaps in the surface**

Single steps or raised thresholds in the built environment are a hazard for persons with ambulant disabilities, visual, hearing or intellectual impairments, and they are impossible for many persons in wheelchairs to independently negotiate and should always be avoided. Where a wheelchair user is negotiating a door, for example, he should be able to do so on a level surface, without a raised threshold. The use of ramped thresholds is equally difficult and should be avoided.

### **C.10.7 Circulation space**

Circulation space around features within the environment, such as to access a desk space, to use a vending machine, to operate a switch, socket or lever, shall be provided.

Doorways should be wide enough to enable wheelchair users to pass through. The clear opening width of the doorway is the key measure, which means that the allowance for the door width and the door frame shall be in excess of the clear opening width. Where more manoeuvring space is required, such as within a wheelchair-accessible toilet, a wider clear opening is needed to allow the wheelchair user to turn within the doorway.

### **C.10.8 Automatic devices**

Automatic devices, such as automatic doors, self-closing fire doors and lift doors, need to be set to accommodate the speed at which persons with mobility impairments can negotiate them. They should not close on a person that stops or pauses in the doorway.

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### **Annex D**

(informative)

#### **Notes on the design and layout of toilet facilities for persons with disabilities**

##### **D.1 General**

All dimensions are critical, the allowable tolerance being  $\pm 10$  mm. The size of a compartment should be at least 1,8 m  $\times$  1,8 m. The toilet roll holder should be positioned as shown in figures D.1 to D.6. A shelf should be fitted adjacent to the basin.

##### **D.2 Toilet**

A 150 mm lever extension to the flush handle should be fitted to both cistern-type and flush-valve-type toilets, and such extension should be located away from the side wall, as shown in figures D.1 and D.2. The height from finished floor level to the top of the toilet seat should be 480 mm. The seat lid should remain upright when raised, to act as a backrest.

##### **D.3 Grab rails**

The diameter of the flange of the grab rail fixings should be a minimum of 75 mm, drilled with no fewer than three fixing holes.

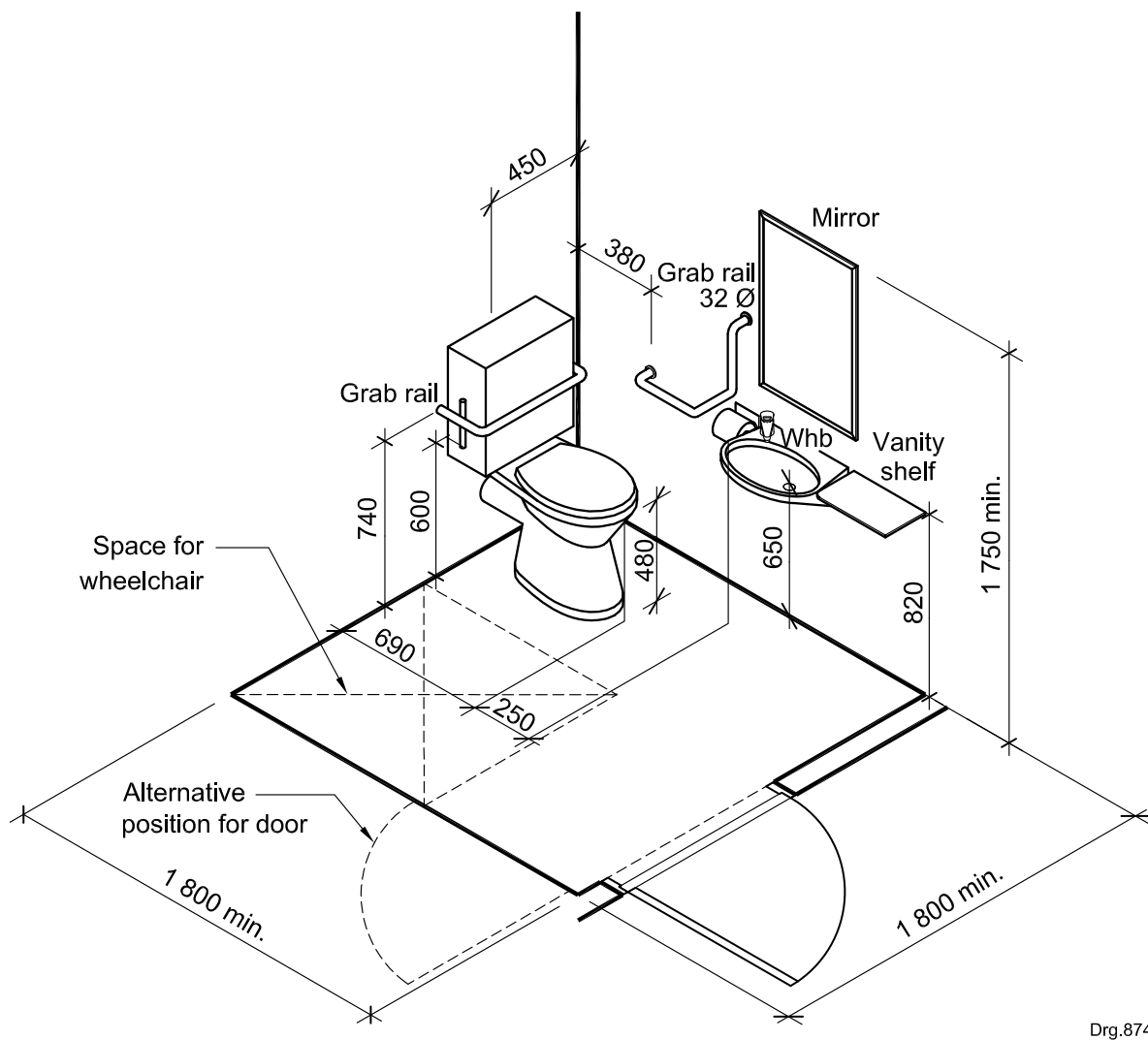
##### **D.4 Typical layouts**

Typical toilet layouts are shown in figures D.1 to D.7

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Dimensions in millimetres



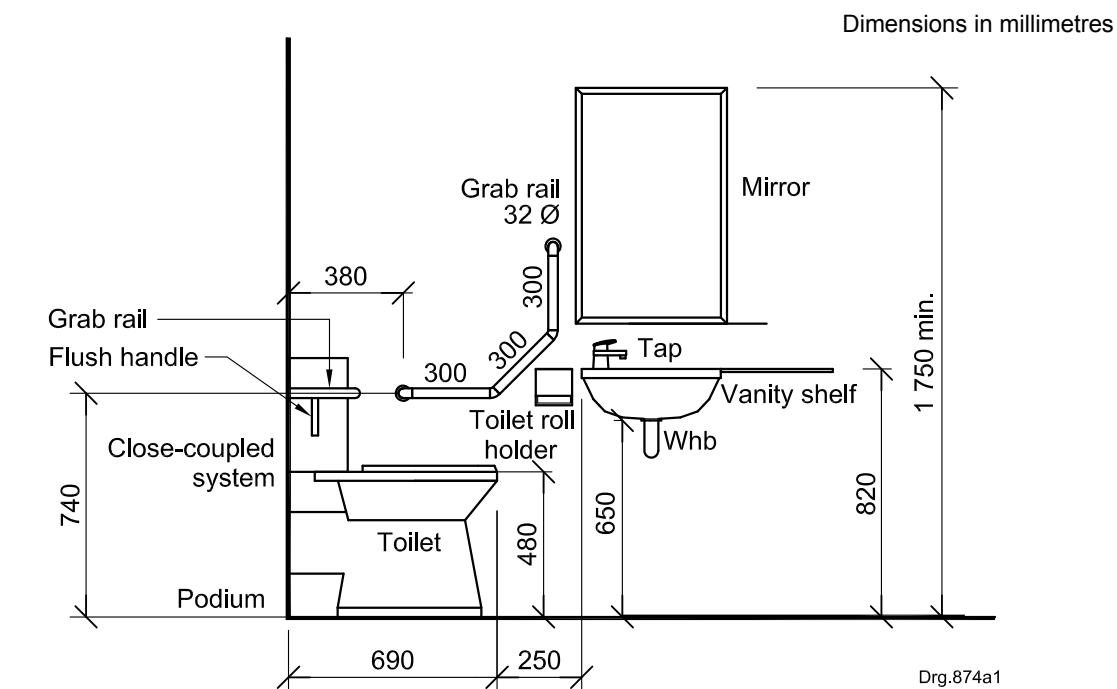
Drg.874

Whb = wash hand basin

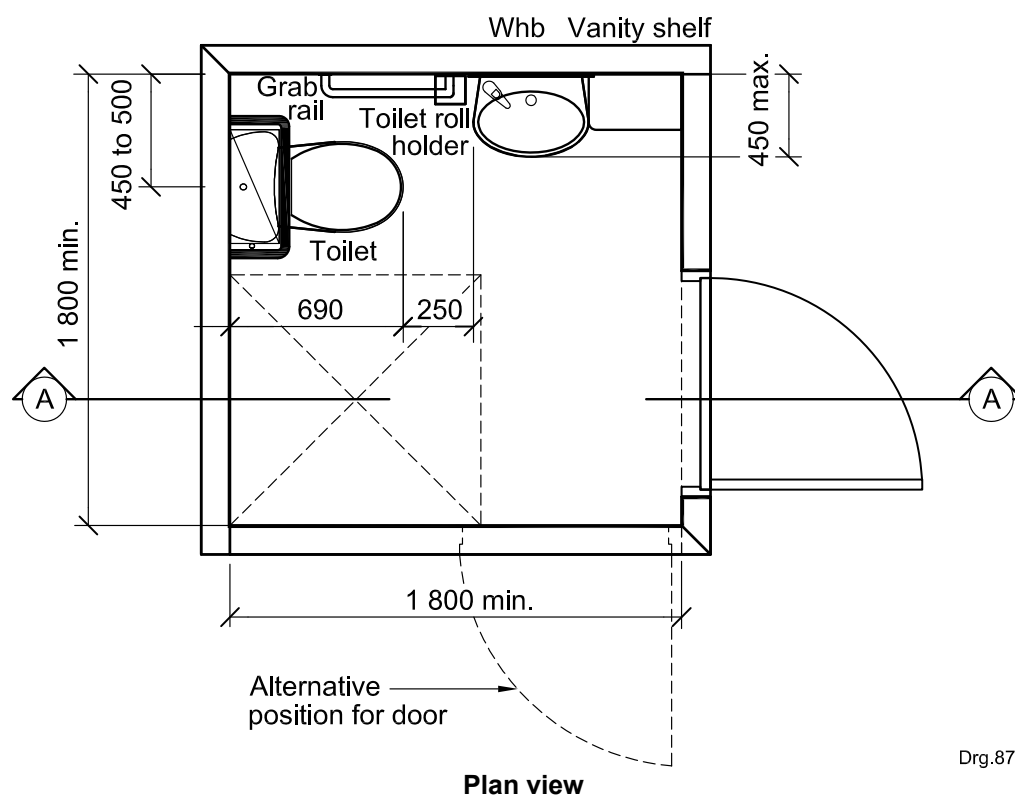
**Figure D.1 — Layout of a typical facility with a close-coupled toilet system**

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**Elevation A-A**



**Plan view**

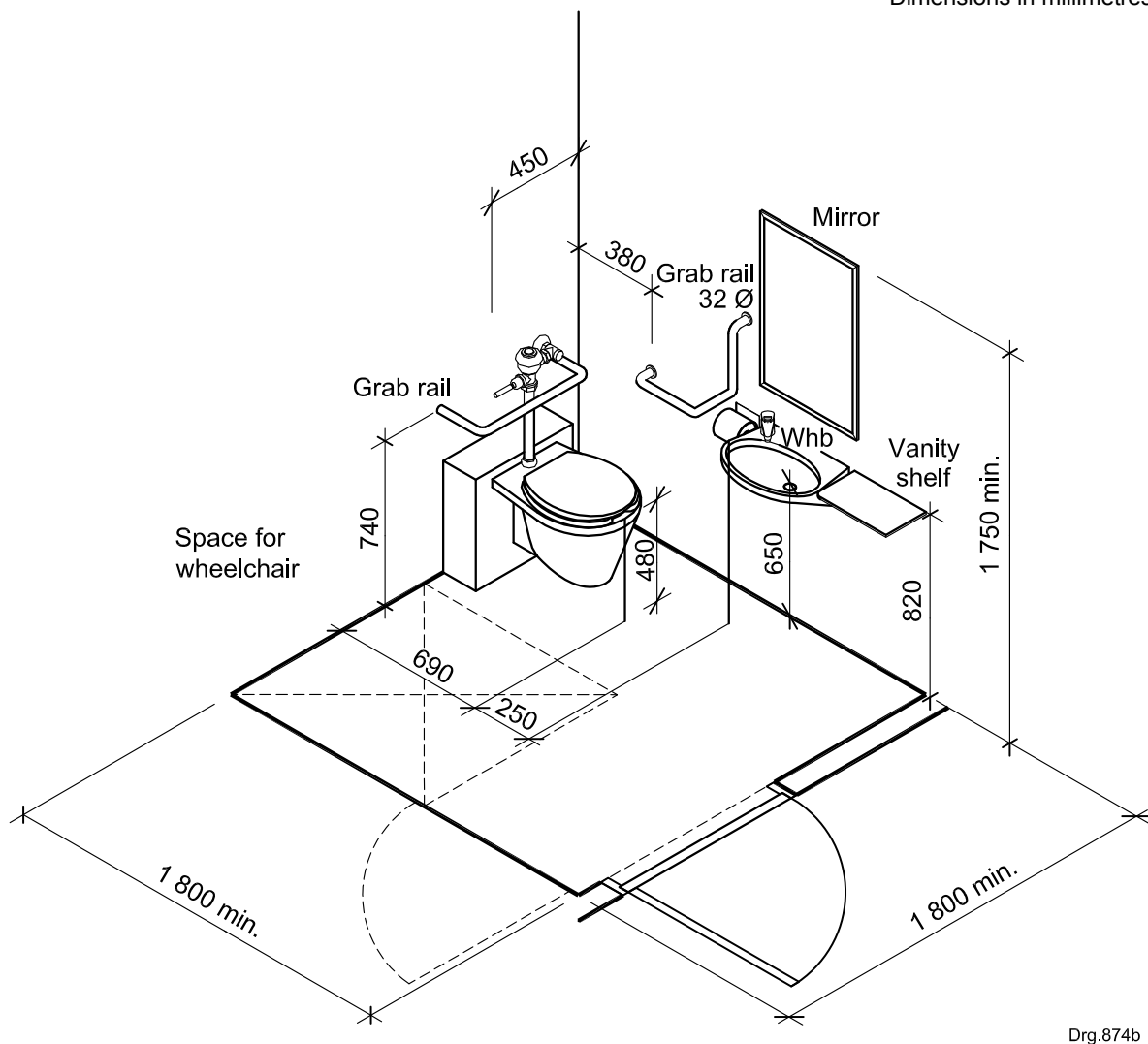
Whb = wash hand basin

**Figure D.2 — Plan and elevation of a typical facility with a close-coupled toilet system**

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Edition 3

Dimensions in millimetres



Drg.874b

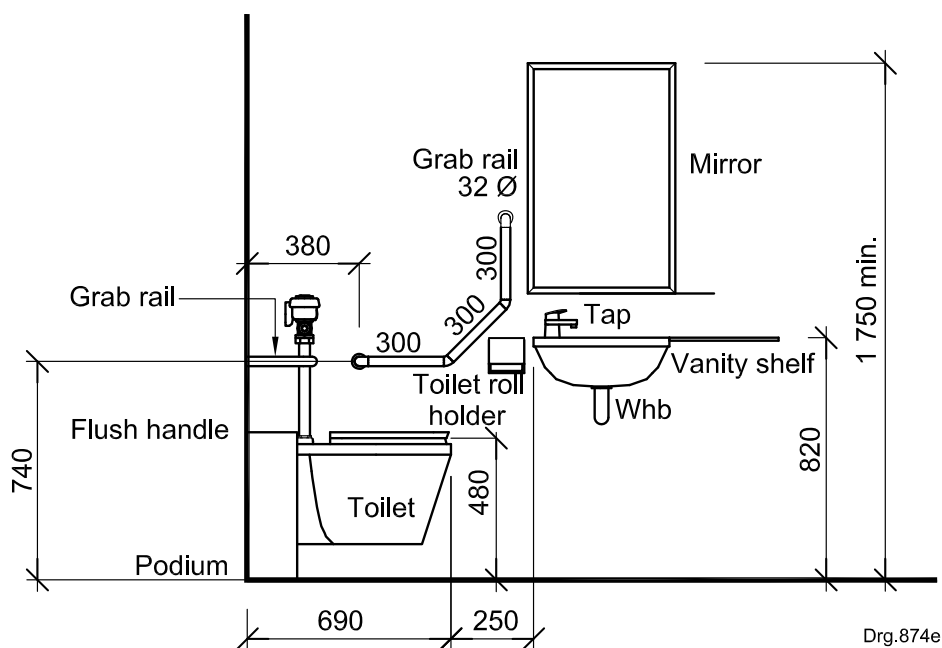
Whb = wash hand basin

**Figure D.3 — Layout of a typical wall-hung toilet system with Flushmaster**

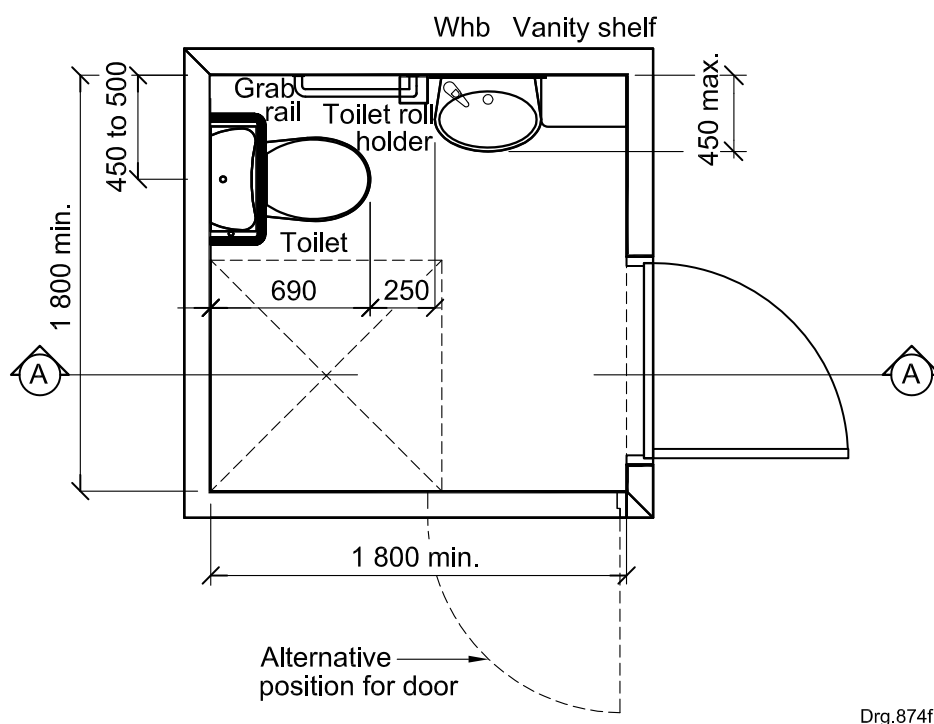
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Dimensions in millimetres



**Elevation A-A**



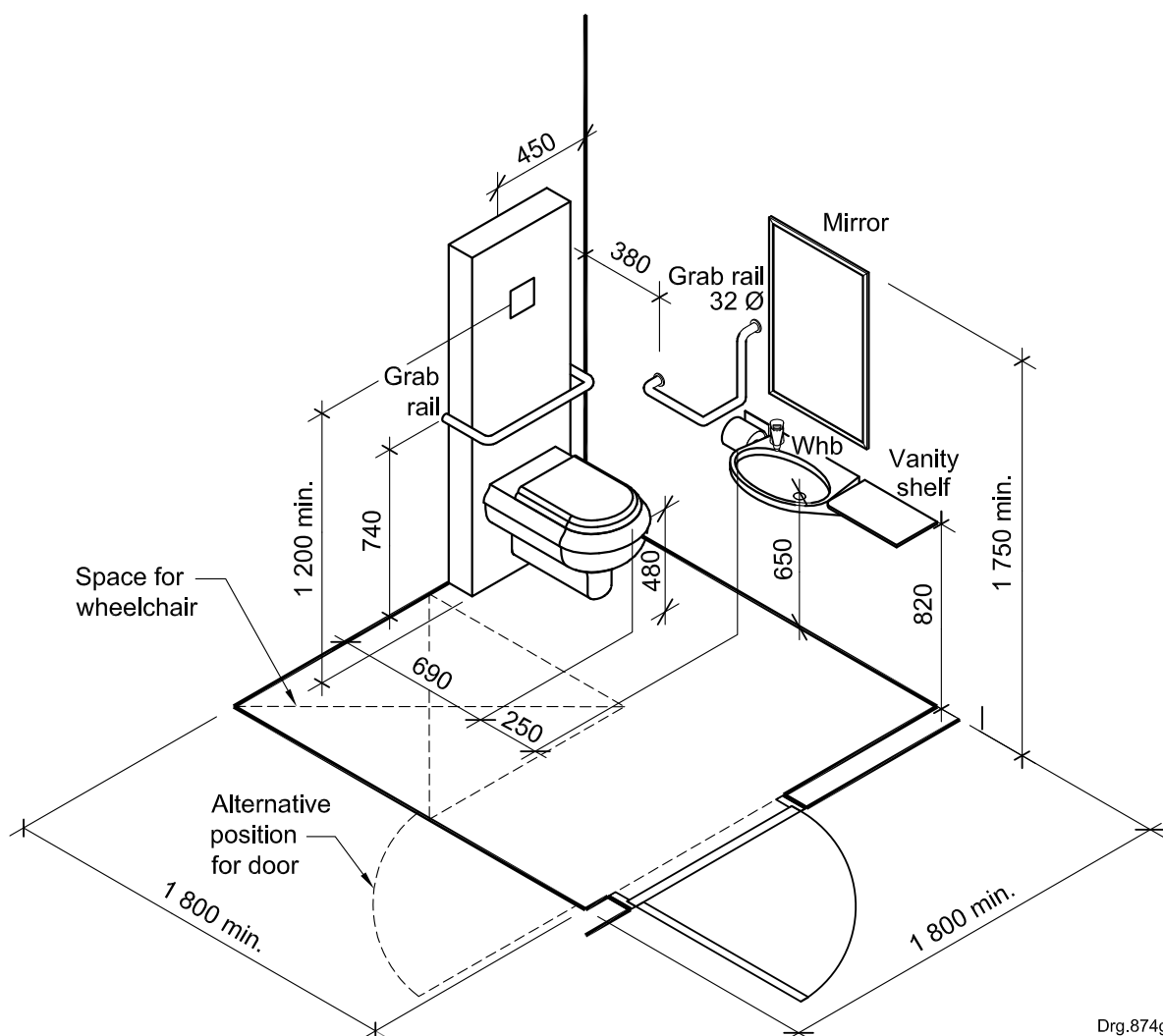
**Plan view**

Whb = wash hand basin

**Figure D.4 — Plan and elevation of a typical wall-hung toilet system with Flushmaster**

**SANS 10400-S:2011**  
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Dimensions in millimetres



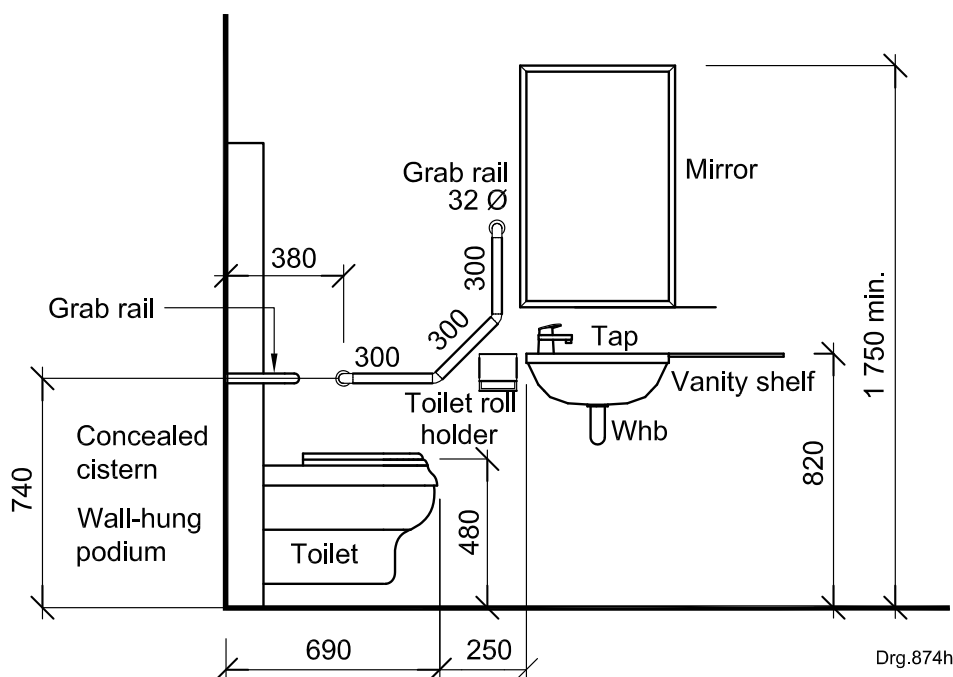
Whb = wash hand basin

**Figure D.5 — Layout of a typical wall-hung toilet system with concealed cistern**

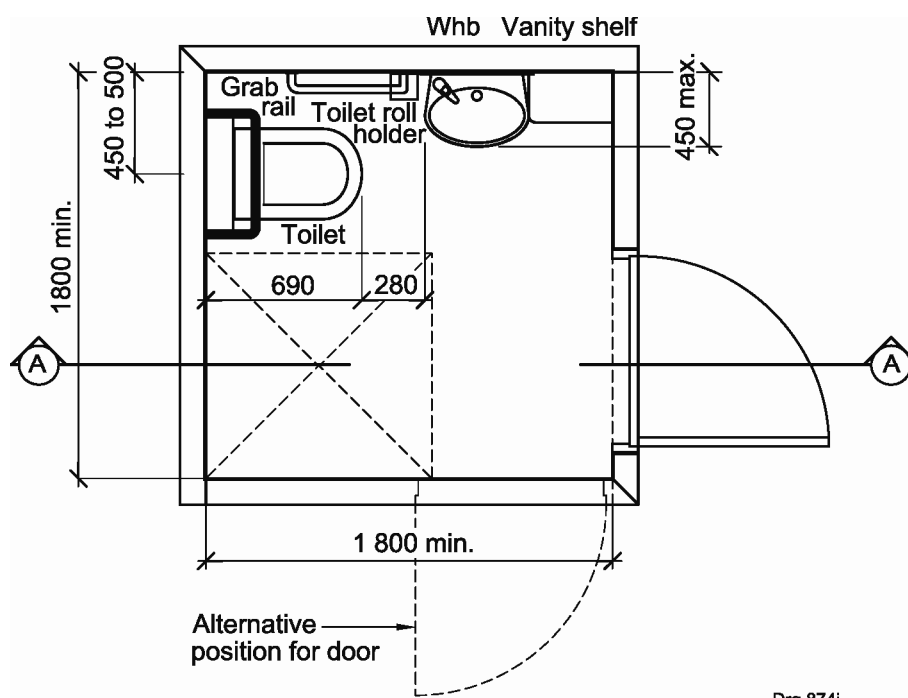
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Dimensions in millimetres



**Elevation A-A**



**Plan view**

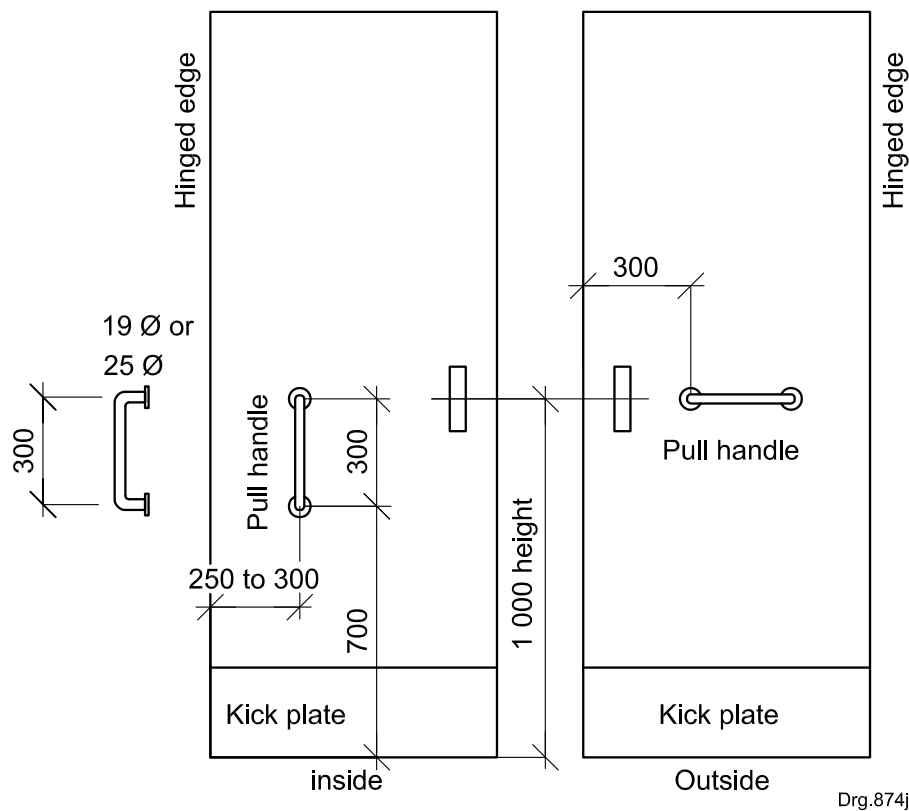
Whb = wash hand basin

**Figure D.6 — Plan and elevation of a typical wall-hung toilet system with concealed cistern**

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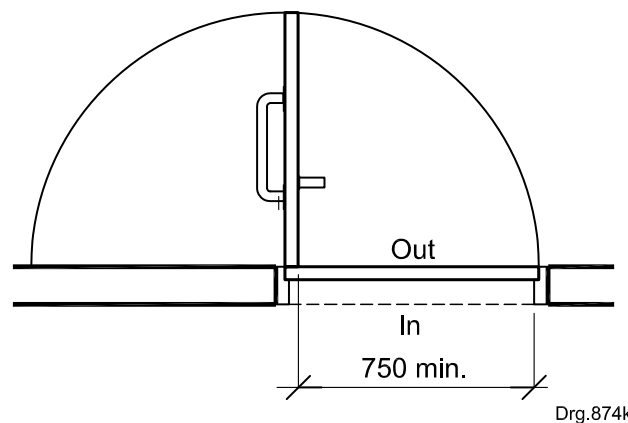
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Dimensions in millimetres



Drg.874j

**Elevation**



Drg.874k

**Plan view**

**Figure D.7 — Plan and elevation of door layout**

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