



A Guide to
Universal
DESIGN
in built environments

**A Guide for Creating Accessible Building Infrastructure for
Persons with Disability**

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“Universal design is the design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialised design.”

Ron Mace, founder and programme director of
The Center for Universal Design

Incorporating universal design in planning, building and running various aspects of the hospitality industry has many merits. Such properties ensure equitable comfort to everyone including but is not restricted to, guests with disabilities, elderly travellers, parents with little children, people recovering from illness (medical tourism) etc. This makes good economic sense as it minimises the need for customised design solutions. It also boosts clientele from these specific groups. Universally designed spaces are also safer for use by all. It has been identified that major tourism by disabled people and international conferences for persons with disability most often are not hosted in India largely because of inadequate accessible accommodations for disabled travellers and participants travelling in groups. With India fast becoming the centrestage for the global market and tourism, it makes good business sense for the hospitality industry to adopt the Principles of Universal Design while designing and running units.

Universal Design India Principles[©]

1. Equitable / Saman

The design is fair and non-discriminating to diverse users in the Indian context

2. Usable / Sahaj

The design is operable by all users in the Indian context

3. Cultural / Sanskritik

The design respects the cultural past and the changing present and assist all users in the Indian context

4. Economy / Sasta

The design respects affordability and cost considerations for diverse users in the Indian context

5. Aesthetics / Sundar

The design employs aesthetics to promote social integration among users in the Indian context



Structural

NEEDS

Parking and Approach to Building

There must be minimally one designated accessible parking space in every 25 parking spaces provided

Location

- The accessible parking bay should be located closest to the entrance, with an accessible route, that is level or gently sloping and minimally 1200mm wide, leading to the building entrance.
- The route to the entrance from the parking must not require the user to cross any vehicular monument.
- The parking and the route connecting it to the entrance should preferably be covered.
- In case of underground parking, accessible parking bays should be located closest to the elevator leading to the lobby level.

Parking Space

- Accessible parking bay should be 4800mm wide, out of which at least 1200mm, on both the sides, is used as transfer bays. Where there are two accessible parking bays adjoining each other, then the 1200mm transfer bay, on one side, may be shared by the two parking bays in between them.
- Length of the accessible parking bay should preferably be 6000mm, including a 1200mm wide transfer zone at the rear to allow loading of the wheelchair. The transfer zones, both on the sides and the rear should have yellow or white cross-hatch road markings.



Signage

- There should be the international symbol of accessibility painted on the 2400mm wide area where the car is to be parked. The symbol should be large enough to be easily visible by person looking for the accessible parking. Recommended size being 1000mm x 1000mm but not larger than 1500mm x 1500mm. The sign painted on the floor should contrast with the floor colour (preferred colours, white and blue)
- There should also be a signboard with the international symbol of accessibility at the height of 1200mm from the floor right at the end of the parking.
- The Symbol of Access should be displayed at approaches and entrances to car parks, to indicate the provision of an accessible parking lot, for people with disabilities within the vicinity.
- Directional signs should be displayed at points where there is a change of direction to direct people with disabilities to the accessible parking lot.

Approach to the Building

- The approach to the building entrance should be clearly defined.
- The surfaces should be firm and even, with a finish which is slip resistant in all weather conditions.
- The width of paths should be appropriate to meet the needs of all users. A recommended clear width of 1800mm will allow two wheelchair users to pass each other on path, however where obstacles are unavoidable and 1800mm width cannot be provided, a clear width of at least 1200mm should be provided throughout the path.
- Any kerbs in the route should have appropriate drop kerbs to allow access to a wheelchair



Summary

- Provide adequate number of accessible parking spaces (1 in every 25 spaces)
- Each accessible parking bay should be minimally 3600mm x 5000mm in size
- Parking bays should be within 30 metres from main entrance door
- Use appropriate signage to indicate location of parking bays

Main Entrance

- Entrance should be easy to locate and adequately signposted
- Consider installing automatic or semi-automatic doors
- Avoid thresholds; if unavoidable, they should be no higher than 6mm
- Doors should be easily identifiable and contrast visually with the surrounding wall
- Where glass doors are used, they should have colour strips or other markers
- The floor texture immediately next to the door should be different from the surrounding floor texture
- There should be a landing of at least 1800mm x 1800mm immediately next to the door.



Lobby, Reception and House Phones



Lobby

- The lobby should be levelled and split levels should be avoided.
- It should have adequate circulation space for a guest on a wheelchair, parents with a double pram or a person with heavy luggage.
- There should be adequate seating space with seats both with and without arm rests.
- Any centre piece that may be used in the lobby should be such that can be easily detected by a person with vision impairments. This can be achieved by making it contrast in colour with the flooring and detectable by a white cane and by having its lower edge less than 300mm above the ground.

Reception

- Location of the reception should be such that it is easily identifiable from the entrance. The approach to the reception should be obstacle free.

- The reception should be designed, so as to accommodate both standing and sitting guests. This can be achieved by providing a seated section that is minimally 1500mm wide x 760mm high x 700mm deep with a 750mm high knee recess. The standing section should range from 950mm to 1100mm in height.
- A minimum clear floor area of 1200mm depth and 1800 mm width is required in front of any reception desk or counter (with a provision of 500mm deep knee recess) to enable sufficient manoeuvring space for wheelchair users. If there is no knee recess provided, then the minimum manoeuvring space required is 1400mm deep and 2200mm wide.
- The face of the receptionist should be evenly lit. The surface of the reception counter should be non-reflective.
- There should be a hearing enhancement system such as a loop induction unit, the availability of which is clearly indicated with a symbol at the reception.

Corridors

- The corridors should provide the circulation routes that allow easy movement and provide a sense of direction.
- Since doors are a potential barrier, it is recommended not to use them in corridors, but wherever used, doorways should be used without a self closing device. Where closing device is needed such as in fire doors, it should be electrically powered so that the closing device is activated only in case of an emergency.
- The corridor should be wide enough to allow easy access to people carrying cases, parents with prams, people on crutches to pass each other on route. The minimum width of the corridor should be 1500mm.
- To aid persons with vision impairments, there should be a good colour contrast between the floor and the wall and also between the wall and the ceiling.
- The minimum lighting requirement in a corridor is 100 lux.
- It is also important that the corridor is acoustically well designed, to avoid excessive reverberation or too much absorption of sound. The floor finish should be non slippery and non glary.

Summary

- Corridors should be level and unobstructed.
- Minimum width of corridors should be 1500 mm with wheelchair turning spaces of 1800mm x 1800mm at regular intervals.
- There should not be any protruding objects up to a height of 2 metres from the floor surface.
- Steps, where unavoidable, should be accompanied by gently sloping ramped access.
- Consider installing a platform lift where providing a gentle ramp may not be possible.
- Incorporate adequate visual contrast between critical surfaces i.e. walls should contrast in colour and tone from the floor and ceiling.
- Provide a maintained illumination level of at least 100 lux
- Floor finish should be non slippery and non glary



Vertical Circulation



Elevator

- Have appropriate directional signs that guide guests to the elevator from all entrances of the building.
- For an elevator to accommodate a wheelchair, it has to be a minimum of 1200mm wide by 1400mm deep. The elevator door should have a clear opening of not less than 900 mm.
- There should be grab bars placed horizontally, at a height of 900mm from the floor level; it should be fixed on both sides and at the rear of the elevator.
- The call button located outside the elevator should have a clear (no obstruction) floor space of at least 900mm x 1200mm to allow a person using a wheelchair to access them. The call buttons should:-
 - o Be installed at a height between 800mm and 1100mm from the furnished floor surface;
 - o Contrast in colour and tone from the background wall;
 - o Have lettering in Braille and also in raised letters; and
 - o Be illuminated.

Elevator (Internal) Controls:

The control panel should: -

- Have a clear (no obstruction) floor space of at least 900mm x 1200mm in front of it, to make it accessible to a person using a wheelchair;
- Be placed (either horizontally or vertically) at a height, between 800mm and 1200mm from the floor level; and
- Have buttons with Braille and raised letters, in sharp contrast, tone and colour, from the background to aid people with visual impairments.

Other Accessibility Features:

- The elevator should have a mirror on the rear wall to aid people on wheelchairs to see behind, without needing to turn around.
- The elevator should have a voice announcement system along with a visual display to indicate the floor level.
- The emergency communication system should be coupled with an induction loop system installed all around the elevator.

Summary

- Elevators should connect all floors, including basement parking.
- There should be adequate directional signs to locate the elevator.
- The elevator should have a minimum internal space of 1200mm x 1400mm and the door should provide a clear opening width of 900mm.
- The controls and call buttons for the elevator should be contrasted in colour from the background, internally illuminated, incorporate raised lettering and Braille, and be installed between heights of 800mm and 1100mm from the floor surface.
- Horizontal hand rails should be installed on the sides and rear of the elevator at a height of 900mm from the floor surface.
- The elevator should have a voice announcement system along with a visual floor level display.
- The emergency communication system in the elevator should be linked to an induction loop system.
- Consider installing a mirror on the rear wall of the elevator.

Platform Lift Stairs

As the name suggests, a platform lift is a simplified version of an elevator, but no match to its range and weight capacity. It is however very useful in situations where there is less room to accommodate the mechanics of a regular elevator and where the payload and the travel distance is not too much. It can be installed quickly and in most cases in a ready to assemble format without much harm to the existing structure. That is why a platform lift may be very useful in older buildings where there is no space to provide access by a ramp or an elevator.

The minimum size of a platform lift should be 900mm x 1200mm. A platform lift can be installed without having a prior shaft. Security features such as hand rails, edge protection and emergency stop buttons also make it a safe and comfortable option. These platform lifts are available in variants that move vertically in a straight line, next to the stairwell or diagonally over the stairs. The choice may vary from case to case.



Summary

- Where provided, the platform lift should have a minimum size of 900mm x 1200mm.
- Platform lifts should incorporate security features such as handrails on both sides, edge protection and emergency stop buttons.



Stairs

The following points need to be considered throughout the facility where stairs exist or are being built:

- Open risers are to be avoided as these are a hazard for persons with impaired mobility. The nosing of the stairs needs to contrast in colour and tone with the tread;
- Have continuous handrails on both sides even on landings;
- The space under the staircase is to be cordoned off either by putting handrails or building a wall in front of it. This space can also be used as a storage area if required;
- There should be a maintained illumination level of 150 mm on the stair surface;
- In external stairs it is advisable to lay tactile warning blocks at the beginning and end of each flight of stairs. The warning blocks are to be laid at a setback of 400mm from the beginning and the end of each flight of stairs.

Summary

- Have colour contrasted nosing of 25mm at the edge of all treads.
- Avoid open risers.
- Circular handrails, that contrast in colour from the background wall, should be installed on both sides of the stairs, fixed with L-shaped brackets, at a height of 900mm from the furnished tread level.
- The handrails should be continuous on both sides, even on landings, and extend 300mm beyond the top and bottom of staircase.
- Tactile warning blocks should be installed at the beginning and end of each flight of stairs.
- The under stair area should be covered and demarked from the circulation area.
- Provide a maintenance illumination level of at least 150mm on the stair surface.

Ramp

- A ramp gradient of 1:15 (or less) is considered adequate and a gradient of 1:12 is the absolute maximum. The ramp with a gradient of 1:12 is considered too steep for many wheelchair users to use independently and usually results in the wheelchair 'flipping' backwards when ascending. It is also equally difficult to control the wheelchair while descending such a ramp. Therefore wherever possible, a ramp should never be steeper than 1:15. The required minimum clear unobstructed width of a ramp (i.e. between handrails) is 1500mm.
- An illumination level of 150lux should be maintained on the ramp.
- Landings should be provided along the length of the ramp, at intervals of every 5 metres for a gradient of 1:12 and every 9 metres for a gradient of 1:15 or 1:20. Landings also need to be provided at the beginning and the end of the ramp and where the ramp turns.
- The materials selected for the surface finish of a ramp should be firm and easy to maintain. It must also be slip resistant, especially when wet.
- There need to be warning blocks at the beginning and end of each ramp in the external environment. The warning blocks are to be laid at a setback of 400mm before the beginning and the end of the ramp.
- The space under the ramp to be cordoned off either by putting handrails or building a wall in front of it. This space can also be used as storage area if required. Handrails must be provided on both sides of the ramp as per specifications given below.

Summary

- Ramps should ideally not be steeper than 1:15.
- Steps should always accompany a ramp and vice-versa.
- Circular handrails should be installed at a height of 900mm from the ramp surface on both sides of the ramp and fixed with L-shaped brackets.
- Ramps should at least be 1500mm wide, and have landings every 5 metres run and at the top and bottom of the ramp.
- Ramp surface should be slip resistant.
- Provide a maintenance illumination level of at least 150mm on the ramp surface.
- Tactile warning blocks should be installed at the beginning and end of the ramp.



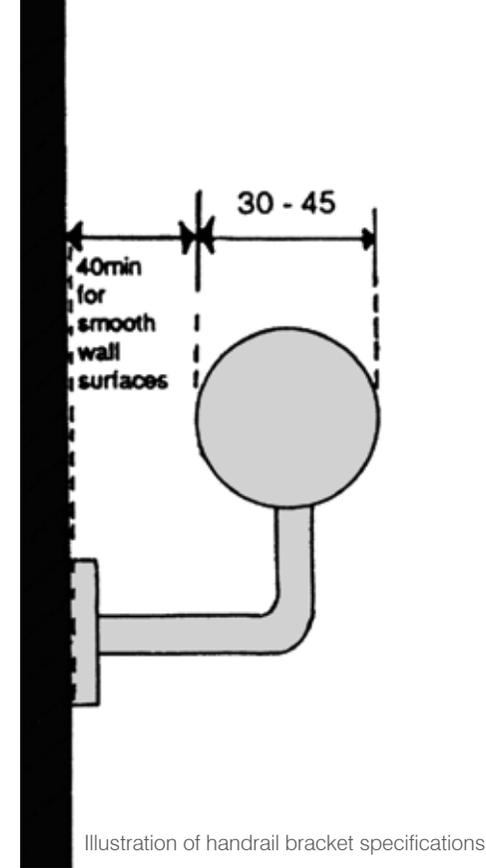
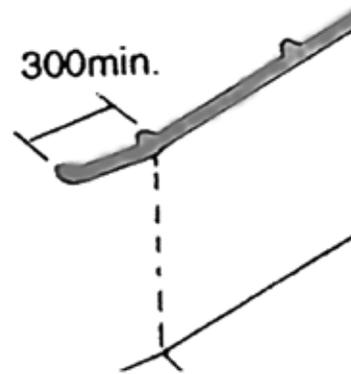
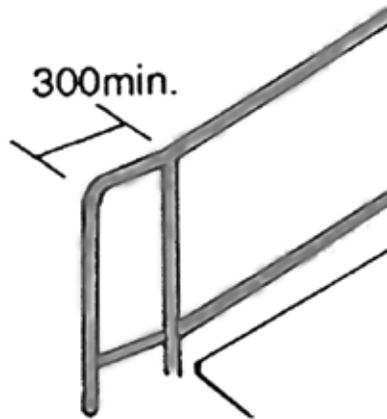


Illustration of handrail bracket specifications

Handrails

Handrails are extremely important features and must be designed to be easy to grasp and to provide a firm and comfortable grip so that the hand can slide along the rail without obstruction. Many disabled persons rely upon handrails to maintain balance or prevent serious falls.

Handrails should: -

- Have a circular section of 30-45mm in diameter;
- Be free of any sharp or abrasive elements;
- Have a minimum clear space of 40mm from the wall;
- Have continuous gripping surfaces, without interruptions or obstructions that can break a hand hold. It is preferable to install L-shaped brackets for this purpose;
- Be continuous, on both the sides, even at the intermediate landings;
- Be provided on both sides of the ramp;
- Extend at least 300mm beyond the beginning and the end of the ramp. The ends of the handrail should return back to the railing or be grouted in the wall or floor so as to prevent any injury to the users;
- Be installed at a height of 900mm to 1000mm;
- Be finished so as to contrast in colour and luminance with the background against which it will be viewed;
- Be made of a material that will not get hot in direct sunlight, especially in outdoor installations.

Restaurant, Bar, Pub and Lounge

All these areas must internally be at one level with adequate circulation space for wheelchairs. All areas of the facility should be accessible, including the buffet and the bar counter. The facility, if not on the principle floor, should be accessible by a guest elevator.

Furniture

- The furniture should not be fixed but movable, to allow creation of extra space, if required.
- There should be an availability of seats both with and without arm rests. The seat height should range from 450mm to 475mm.
- There should be a clear unobstructed space of 750mm under the table. Fancy table legs can inhibit a close access to the table by persons on wheelchairs.
- Furniture should contrast with the floor and use of heavy patterns should be avoided on the furnishing.



Finishes

- Adequate colour contrast must be provided between the floor and the wall and also between the wall and the ceiling.
- Consider having the crockery and the glassware contrast with the table/ tablecloth.
- Lighting in these facilities may range from 50 lux to 200 lux and should not create a glare.
- Heavy carpet piles, heavy irregular, geometric or stripped patterns should be avoided. The flooring should be non slippery.
- It is important that the restaurant have menu cards made available in Braille and in large print.
- At least one person in each shift is to be instructed in basic sign language and the staff must be aware of how to announce food while serving a blind guest.
- Apart from having the regular glassware and cutlery (which is usually large and heavy), some lighter and easy grip glassware and cutlery should also be made available in each restaurant.



Summary

- All facilities should be located on floors that are connected by the elevator.
- The furniture should be removable, and contrast in colour from the floor and from the crockery used. There should be a provision of chairs with and without arm rests. The tables should have a knee recess of 750mm height.
- There should be lowered counters that are 760mm high at the bar.
- There should be a maintained illumination level of 50 lux to 200 lux and the lighting should not cause glare.
- Avoid thickly piled carpets and heavily patterned flooring or carpets.
- Flooring should be slip resistant.
- Menu cards should be available in large print and in Braille.
- Easy grip cutlery and glassware with built up handles should be available.
- Staff should offer to read out the menu and explain food layout on the plate to persons with vision impairments.
- Where there is a self-service or buffet style layout, staff should offer to serve persons with disabilities at their respective tables.
- At least one staff member in each shift should be able to communicate in basic sign language.

Business Centre and Conference Facility

Most hotel properties have at least one business centre and conference room facility, both these facilities must have an accessible route leading to them. In case these facilities are not situated on the principal floor, they must be accessible by guest elevators.

Conference Facilities

Conference and banquet halls should be at one level. The podium must be accessible to wheelchair users by a ramp. Have a lower lecture stand available with a maximum height of 800mm. The lecture stand must have a provision for local light. There must be an accessible toilet in the area where banquets are provided.

Furniture

- Should not be fixed but movable, to allow creation of extra space, if required. Seats, both with and without arm rests, should be available at such facilities.
- The seat height should range from 450mm to 475mm. There should be a clear unobstructed space under the table of 750mm.
- Furniture should contrast with the floor and use of heavy patterns should be avoided on the furnishing.
- The lighting at a conference facility should range from 300 lux to 500 lux, especially on the podium. The background of the podium should be lit in a way that a sign language interpreter on the stage is clearly visible.

Business Centre

The business centre should be all at one level. The entrance door to the business centre should be minimally 900mm wide. All tables should have a minimum knee clearance of 750mm. The boardrooms should have adequate circulation space for a wheelchair. Lighting in the boardroom should have a maintained luminance level of at least 300 lux, and preferably 500 lux



Summary

- These should be located on the floors that are connected by an elevator and have accessible restrooms. There should be level or gently sloping access from the corridor.
- There should be provision of removable chairs that have a seat height of 450mm to 475mm. There should be availability of chairs with and without arm rests.
- The tables should have a clear knee space of 750mm height.
- All furniture should contrast from the floor.
- There should be a maintained illumination level of 300 lux to 500 lux.

Pool, Spa and Health Club



Pool

Bare feet on wet floor surfaces make movement both difficult and dangerous for the ambulant disabled person, therefore the floor finish in the pool and shower area should be carefully selected to be slip resistant, even when wet.

Entering the Pool

- For a pool, less than 91 linear metres in length, at least one accessible means of entry should be provided (like a swimming pool lift or a sloped entry).
- There must be a provision for accessible toilets, shower areas and dressing rooms in close proximity to the pool.

Swimming Pool Lift

- The pool lift should be located where the water in the pool does not exceed 1200mm. The lift should be installed as per the specifications provided with the product.
- The height of the lift seat should be a minimum of 400mm to a maximum of 500mm measured from the deck to the top of the seat surface. The seat should be a minimum of 400mm wide.
- Foot rests should be provided and should move with the seat. Arm rest (where provided) on the transfer side of the lift should be removable or should fold clear of the seat when the seat is in the raised (load) position.
- The lift should be designed so that the seat will submerge not more than 450mm to a water depth below the stationary water level.

Accessible Pool Stairs

- Accessible pool stairs are designed to provide assistance with balance and support from a standing position when moving pool deck into the water and out.
- The steps must have a uniform riser of 150mm and tread of 300mm. Open risers are not allowed.
- The pool stairs must have handrails on both sides. The distance between the two rails must be 500mm minimum to 600mm maximum.
- Handrail extensions are required on the top of the landing of the stairs and not at the bottom.
- The height of the handrails must be 850mm to 900mm from the step nosing.
- Handrail if mounted on the wall must have a clearance of 400mm between the wall and the rail.

Changing Areas

Disabled users may prefer the privacy of an individual cubicle and, wherever possible, these should be provided. At least one accessible changing-cum-shower cubicle should be provided in both ladies and gents changing areas.

Additionally, consider providing a unisex accessible changing room complete with shower and toilet. These enable assistance to be given by someone of the opposite gender.

Key accessibility requirements for changing areas:

- Changing areas should be clearly signposted. Locate signs on wall adjacent to door edge to allow easy identification of the changing facilities;
- Sufficient space should be provided for manoeuvring wheelchairs – minimum clear turning diameter of 1800mm.
- Allowance to be made for a wheelchair user to change without obstructing other users;
- Direct access to be provided to the shower area from the changing room. Accessible toilet provision should be at very close proximity to the changing area.

Sitting Benches

- All benches must have a minimum depth of 450mm (ideally 500mm) and be set at a height of 480mm to allow easy transfer from a wheelchair. These should have a smooth finish to surfaces and no sharp edges.



Lockers

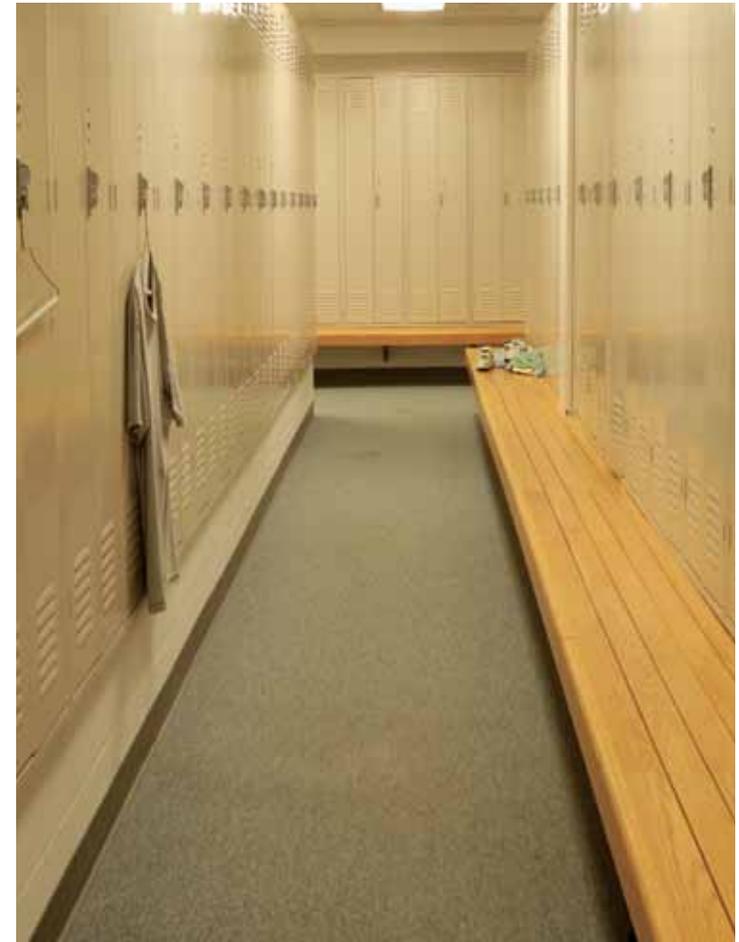
- Sufficient lockers should be set at heights between 400mm and 800mm and be at least 300mm wide.
- Some lockers should be at least 1200mm high to accommodate mobility aids and so on. Ideally some full-height lockers must be provided.
- Alternate coat hooks should be located between 900mm and 1200mm above floor level to enable use by wheelchair users.

Colour Contrast

There should be adequate colour and tonal contrast between fittings, walls, ceilings, floors and so on to assist persons with vision impairments.

Spa

All treatment rooms should be wide enough to accommodate wheelchair users. Door width of all rooms should be at least 900mm. Changing room facility should be as per specification mention in the section 'Changing Areas', in this chapter.



Summary

- All facilities should be located on floors that are connected by the elevator.
- Some accessible restrooms, shower rooms and changing areas should be provided in these facilities.
- The pool should have an accessible stepped entry that is or can be equipped with a pool lift.

Accessible Public Restroom

Accessible toilets may be provided at all lobbies where public toilets are provided. Accessible toilet facilities may also be provided near the banquet areas and in the Health Centre. It is recommended to have a unisex accessible toilet room.

- Unisex accessible toilet should be no less than 1800mm X 2550mm where a floor mounted water closet is used.
- The toilet door should either be an outward opening door or a sliding type.
- Be provided with a horizontal pull-bar, at least 600mm long, on the inside of the door, located so that its one end (which is closer to the hinge) is 130mm from the hinged side of the door and at a height of 1100mm.
- Be capable of being locked from the inside by a device that is operable by one hand, activated by a force not more than 22 Newtons and which does not require fine finger control, tight grasping, and pinching or twisting of the wrist.

Grab Bars

Grab bars assist persons with mobility and balance problems to use the water closet safely. These should:

- Have a circular section 30-45mm in diameter and be free of any sharp or abrasive elements;
- Be mounted at a height of 200mm from the water closet seat;



- In the accessible unisex toilet unit:
 - One horizontal grab bar should be mounted on the side wall closest to the water closet, extending from the rear wall to at least 450mm in front of the water closet seat;
 - Another horizontal grab bar should be mounted on the wall behind the water closet and be at least 750mm long; and
 - Where possible, a hinged drop-down rail should be provided on the open side such that its centre line is 320mm from the centre line of the water closet and extends 100 to 150mm beyond the front of the water closet.

Water Closet

- Be located between 460mm to 480mm from the centre line of the water closet to the adjacent wall and have a clear dimension of 750mm from the front edge of the water closet to the rear wall to facilitate side transfer. The top of the water closet seat should be 450 to 480mm from the floor.
- Have adequate clear floor space of
 - At least 1350mm depth and 900mm width, both in front and on the transfer side, in the accessible unisex toilet unit;
- Have a back support where there is no seat lid or tank.
- Preferably be of wall-hung or corbel type as it provides additional space at toe level;
- Have lever type or automatic flush control which should be located on the transfer side of the water closet. The flush control which should not be located more than 1100mm from the floor.

Wash Basin

To comply with accessibility requirements, the wash basin should:

- Be mounted such that the minimum distance between the centre line of the fixture and the side wall is 460mm. The top edge is between 800mm and 840mm from the floor;
- Have a knee space of at least 750mm wide by 200mm deep by 750mm high;
- Have a minimum clear floor space of 750mm wide by 1200mm deep, of which a maximum of 480mm in depth may be under the wash basin;
- Have the hot water and drain pipes within the knee space or toe space properly insulated;
- Have automatic or lever type faucets;
- Have two 600mm long vertical grab bars, where the wash basin is meant to be used by people with ambulatory disabilities, installed on either side of the basin with their mid points at 1100mm from the floor level.

Layout

The layout of the fixtures in the restroom should be such that there is a clear manoeuvring space of 1800mm x 1800mm in front of the water closet and wash basin in the accessible toilet unit. Also, all fixtures and utilities should provide a clear space of 750mm x 1200mm for the wheelchair user to access them.



Additional Considerations

- There should be adequate colour and tonal contrast between the fixtures, walls and the flooring. This is to enable easy recognition by persons with vision impairments.
- Where more than one accessible toilet is provided, a left and right hand transfer option should be made available.
- There should be a visual emergency alarm in the toilet.
- All utilities and accessories such as soap dispenser, hand dryer etc. should be installed between heights of 800mm and 1100mm from the floor surface.

Summary

- A unisex accessible toilet unit should be provided wherever public toilets are provided.
- Minimum size required for the unisex accessible toilet unit is 1800mm x 2350mm (with a wall hanging WC). The toilet cubicle for ambulatory disabled should be at least 800mm x 1500mm.
- Layout should provide for an unobstructed wheelchair manoeuvring space of 1800mm x 1800mm and a clear floor space of 750mm x 1200mm in front of all toilet fixtures and other utilities.
- The wall should contrast visually from the floor, the door from the wall, and all toilet fixtures should contrast in colour from both the wall and the floor.
- An audio and visual alarm should be installed in the toilet and it should be linked to the central emergency alarm system.
- Operable parts of all toilet utilities and accessories should be installed between the heights of 800mm and 1100mm from the floor surface.
- Toilet door must be outward opening or sliding type.
- A 600mm long horizontal pull bar should be installed, 130mm from the hinged side, on the door at a height of 1100mm from the floor level.
- WC installed in the accessible toilet unit should preferably be wall hung.
- The WC should be installed in a corner with the centreline of the WC at a distance of 460mm to 480mm from the adjacent wall.
- There should be a clear floor space of 900mm x 1350mm on the transfer side and in front of the WC in the accessible toilet unit.
- The seat height of the WC should be between 480mm. Where there is no WC seat lid or tank, a back support should be provided.
- Lever type flush control should be installed at a height of 1100mm from the floor surface, on the transfer side of the WC.
- One horizontal grab bar should be installed on the rear wall and another one on the adjacent wall, both at a height of 200mm from the WC seat. Another vertical grab bar should be provided on the adjacent side wall and, where possible, a hinged drop-down rail should be provided on the transfer side next to the WC in the accessible toilet unit.
- A wash basin of 520mm x 410mm size should be installed at a distance of at least 460mm from the side wall.
- The top edge of the wash basin should be between heights of 800mm and 840mm from the floor level. There should be clear knee space of at least 750mm height x 750mm width x 200mm depth under the wash basin, with additional toe space of 300mm height x 750mm width x 230mm depth.
- The wash basin should have automatic or lever type faucets.



Accessible Guest Rooms

- The designated accessible room should be accessed through an accessible route from the lobby.
- The location of the accessible room should be decided taking the following points into consideration:
 - Ease in evacuation; therefore a lower floor room may be better.
 - Easy and direct access from the guest elevator.
 - Easy to locate on the floor.
 - An interconnected room with the accessible room, that may be used by a carer or a companion.



Furniture and Furnishing

- Within the room, there should be an unobstructed route to all furniture of 900mm width with an 1800mm X 1800mm turning radius somewhere.
- In case of twin beds, there should be a minimum space of 900mm between the two beds.
- The bed height should be 500mm from the floor. This includes the mattress.
- Have clear space of 1100mm in front of an open wardrobe. The rails provided in the wardrobe should be adjustable and be provided at the height of 1000mm and 1400mm from the floor.
- The study table should be minimally 900mm wide, 700mm deep and 760mm height. There should be a clear knee recess 700mm high, under the table.
- All knobs provided in the room should be lever type, easy to grip and contrast in colour with the background
- There should be a minimum of one seat with armrests.
- The provision of hairdryer should be at a height ranging from 800mm to 1000mm from the floor, and be close to a mirror.
- The tea counter provided should be no higher than 850mm.
- Adequate colour contrast must be provided between the wall and the floor and other furniture in the room.
- The vertical card swipe key system should be installed between 900mm and 1000mm from the floor, with the highest point being no higher than 1000mm. In case a Card Entry Operated system is used, it should be put at a height between 900mm and 1100mm from the floor and 200mm from the door frame.



- The keyhole should be at a height between 900mm to 1000mm from the floor.
- The door force required to open the accessible guest room door should be no more than 20 Newtons at the edge of the door, with magnetic door stoppers at the back.
- The door handle used should be a lever type and contrast well with the colour of the door.

Controls

- Emergency assistance alarm with a reset button operable from the bed and the adjacent floor area to be provided. The height of these buttons on the adjacent side of the bed should be 100mm from the floor. The button next to the bed should be at a height ranging from 750mm to 1000mm.
- The fire alarm provided in the room and the en-suite shower room should be both audio and visual.
- The door bell should have a visual indicator in the form of a light that glows when the door bell is rung and the light turns off only when the door is answered.
- All sockets should be placed at a height ranging from 400mm to 1000mm height from the floor. They should be minimally 350 mm from the corner of the room. They should have a clearly indicated on/ off.
- All switches including the air conditioning controls and the master key slot should be between 750mm to 1100mm.
- It is preferable if the light switch plates contrast in colour with the wall.

Summary

- It is good to have one accessible guest room in every twenty guest rooms.
- There should be an accessible route from the lobby with a clear opening door width of at least 900mm. The highest point of card swipe should be no more than 1100mm from the floor.
- Key hole should be between 900mm to 1000mm
- The room door should be light to open with a magnetic stopper.
- Room identification number should be in Braille and embossed on the wall, not the door.
- There should be 1800mm x1800mm turning space in the room.
- Within the room there should be 900mm wide unobstructive route to all furniture.
- Twin beds should have minimally a 900mm wide space between them.
- Bed height should be about 500mm from the floor including mattress.
- There should be a space of 1100mm in front of the wardrobe with adjustable clothes rod height.
- The study table should be minimally 900mm wide, 700mm deep and 760mm high with a clear knee recess 750mm high under the table.
- All knobs and handles should be lever type.
- All amenities such as a hair dryer and magnifying vanity mirror should be between 800mm to 1100mm from the floor
- Tea counter to be at a maximum height of 850mm with cordless kettle and light weight cups.
- There should be adequate colour contrast between the floor and the wall and the wall and the furnishings.
- There should be an emergency alarm operable from the bed and also from the adjacent floor.
- Fire alarm provided should be both audible and visible.
- Door bell should have a visual indicator.
- All sockets should be between 400mm and 1000mm from the floor and 350mm from the wall corner
- All switches and controls should be between 750mm and 1100mm from the floor.
- All switches should contrast in colour from the wall.



En-suite Shower Room and Bathroom

An accessible guest room should have an en-suite accessible shower room. The minimum dimensions of an accessible shower room with a water closet and wash basin are 2300mm x 2400mm.

General Requirements

- The door of the shower room should either be outward opening or sliding in nature. The minimum door width should be 900mm.
- Be capable of being locked from the inside by a device that is operable by one hand, activated by a force of not more than 22 Newtons and which does not require fine finger control, tight grasping, and pinching or twisting of the wrist.
- The floor used should be slip resistant and should contrast in colour with the wall. Luminance should be minimally 150lux.
- Emergency assistance alarm with a reset button operable from the water closet should be provided.

En Suite Shower

- The shower floor should fall towards the drain.

Shower Seat

A shower seat should be provided that:-

- Is self-draining, non-slip and with rounded edge;
- Should be on the wall nearest to the controls, such that the center line of the shower seat is at a distance of 500mm from the adjacent wall;
- Have a minimum dimension of 400mm wide extending the full depth of the cubicle, minus the space required for the shower curtain; and
- Have its top 480mm from the floor. May be hinged to be able to fold up after use.



Taps

- Taps should be mixer type, located so that it is easily reached from a wheelchair but does not get in the way of access to the bath.

Towel Rail

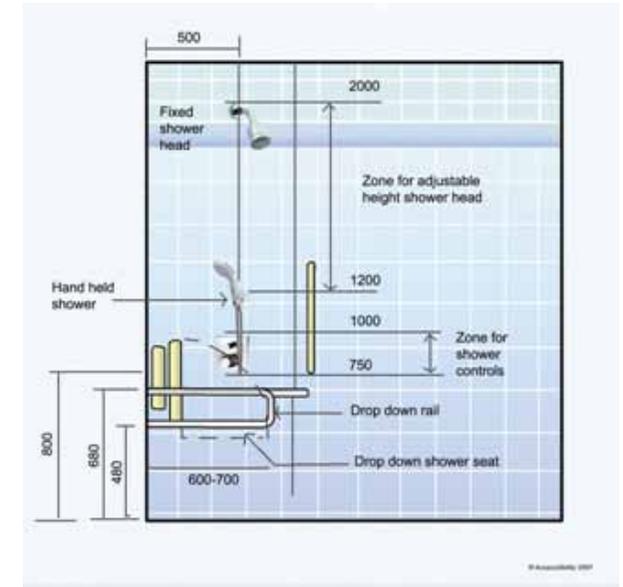
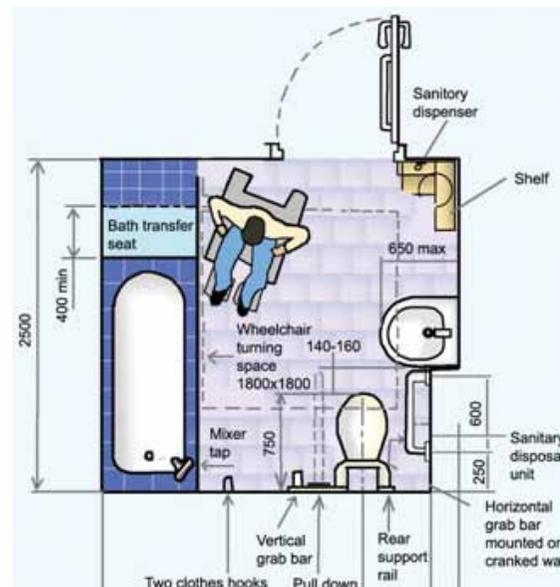
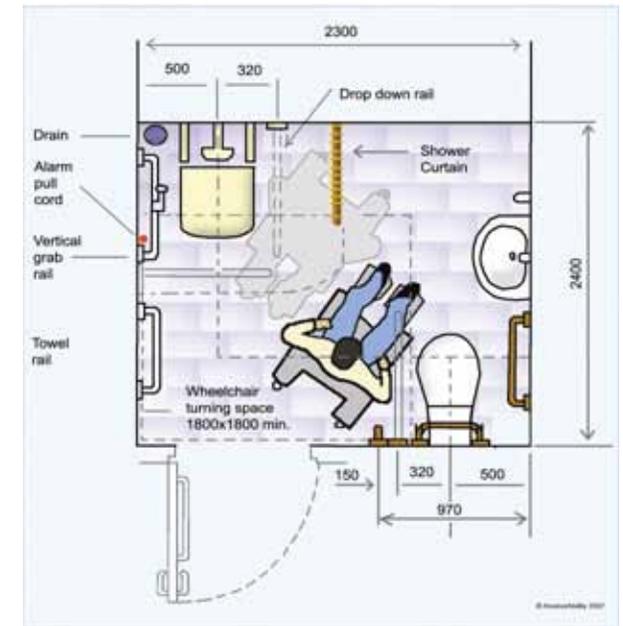
It should be installed between heights of 900mm and 1100mm from floor level, reachable from the tap side of the bath tub.

Bath Grab Rail

- The horizontal grab rail, running across the length of the bath, plus the transfer seat (if any) is to be installed at a height of 555mm to 580mm from the finished floor. Alternately this rail can be cranked at a maximum angle of 13 degrees to the horizontal, from the centre.
- A vertical handrail, 500mm long to be installed at a distance of 600mm from the wall, at the tap side of the bath. This rail is to be installed at a height of 680mm from the finished floor.
- The grab rails should be 35mm to 45mm in diameter fixed with a clearance of 50mm to 60mm between the rail and the wall. The material of the grab rail should be such that it has a good grip even when wet and should contrast visually from the background.
- The water closet and the wash basin to be fixed as per specifications given in the Accessible Public Rest Rooms section.

Summary

- The en-suite bathroom should have minimal internal dimensions of 2700mm x 2500mm.
- The width of the bath tub to be 700mm and the length between 1600mm to 1700mm and at a height of 480mm
- Taps should be mixer type with lever type faucets.
- Vertical grab rails, 500mm long to be installed at the tap side of the bath, at a distance of 600mm from the wall and at a height of 680mm from the finished floor.
- Horizontal grab bar, running across the length of the bath tub (and the transfer seat if any) is to be installed at 555mm to 580mm from the finished floor,
- Alternately the horizontal rail can also be cranked at a maximum angle of 13 degrees to the horizontal from the centre.
- Towel rail should be installed between 900mm and 1100mm from the floor level.



Emergency Egress

When planning emergency evacuation procedures, it is important to include needs of persons with disabilities. Accessibility is not only about providing independent ingress and usage of the hotel premises but also ensuring safe egress for persons with disabilities. The following text explains the important aspects of emergency and evacuation, which need to be considered for persons with disability.

Raising the Alarm

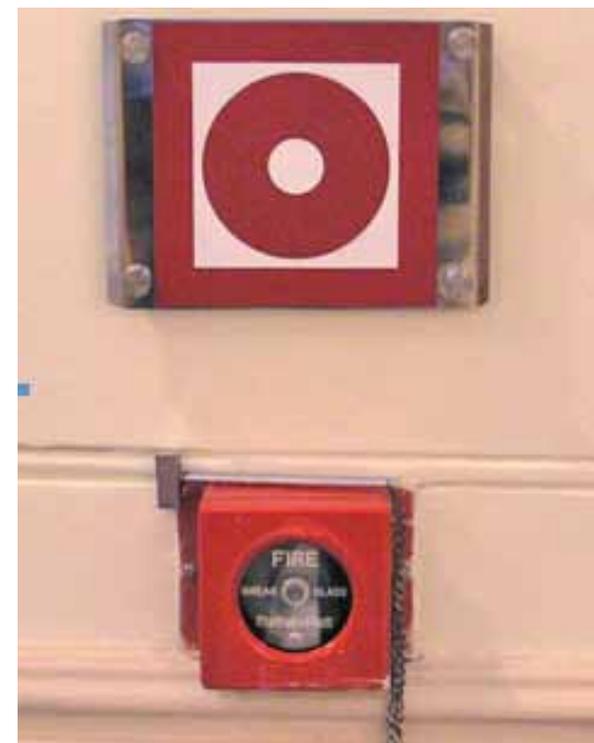
Placement (accessibility) and visibility of such devices is very important. The following is to be considered for the installation of such alarm devices;

- Fire alarm boxes, emergency call buttons and lit panels should be installed between heights of 800mm and 1000mm from the furnished floor surface. These should be adequately contrasted from the background wall and should be labelled with raised letters and should also be in Braille.
- A pre-recorded message, alerting an emergency to the control room or reception should be installed in the room telephone in the accessible bedroom and this should be accessible by a 'hotkey' on the phone keypad. This 'hotkey' should be distinct from the rest of the keypad.

Alerting Systems

In emergency situations, it is critical that people are quickly alerted to the situation at hand, for persons with disability the following needs to be considered.

- Consider having audible alarms with 'voice instructions' that can help guide them to the nearest emergency exit. As an alternative to the pre-recorded messages, these alarms may be connected to the central control room for on-the-spot broadcasts.
- Non-auditory alarms (visual or sensory) to alert persons with hearing impairments should be installed at visible locations in all areas that the guest may use (including toilet areas, etc.).



Non-auditory alarms include:

- Flashing beacons
- Vibrating pillows and vibrating beds.
- Pagers or mobile phones that give out a vibrating alarm along with a flashing light (these may be issued to persons with vision or hearing impairments at the time of check-in to the hotel.)

Written Evacuation Procedure

A written evacuation procedure that details the egress plan for disabled guests should be installed behind the entrance door in the accessible guest rooms and also in other facilities that the guest may visit e.g. changing rooms in the health club. The evacuation procedure should be detailed in large print letters that contrast strongly against the background. Where possible, it should also incorporate raised letters and Braille. The evacuation route should be displayed on a high contrast tactile map for benefit of persons with vision impairments.

Emergency Evacuation Route

- Designate routes that are at least 1200mm wide, to ensure a wheelchair user and an able bodied person are able to pass each other along the route. The route should be free of any steps or sudden changes in level and should be kept free from obstacles such as ash trays and flower pots.
- Use appropriate signage along the route. Orientation and direction signs should be installed frequently along the evacuation route and these should preferably be internally illuminated. The exit door signage should also be internally illuminated.
- A 'way guidance lighting system' consisting of low mounted LED strips to outline the exit route (with frequent illuminated direction indicators along the route) should be installed along the entire length of the evacuation route. This is to supplement the overhead emergency lighting units, conforming to the Indian Standard IS: 9583-1981, that are recommended by the "Delhi Fire Prevention and Fire Safety Act, 1986" and "Delhi Fire Prevention and Fire Safety Rules, 1987".

Research indicates that way guidance systems allow people with vision impairments to walk significantly faster than traditional overhead emergency lighting and/ or normal overhead lighting. Moreover, emergency exit lights and directional signals mounted near the floor have been found to be useful for all people in cases where a lot of smoke is present.

Considerations when installing the way guidance system:

1. Minimum luminance on the floor should be at least 1 lux along the centre line of the route and on stairs.
2. Install clear illuminated sign above exit and also directional signage along the route.
 - The directional exit signs with arrows indicating the way to the escape route should be provided at a height of 500mm from the floor level on the wall and should be internally illuminated by electric light connected to corridor circuits.



- Signs should be large enough to be recognised from a distance, and symbols and legend on signs should be at least 150mm in height and arrows should be minimally 35mm in height for the signs to be understood at a distance of 1 metre.
3. Escape route lighting should be as simple and clear as possible, and wall markings as continuous as possible.
 4. It is preferable to have LED tracks on both sides of the corridor to outline the escape route and also give an idea of width of the corridor. LED strips should also be installed on the nosings of stairs in the evacuation route.

Refuge Area

It is strongly recommended that a refuge area be provided at least on the floors that accommodate the accessible guest rooms and other common facilities, such as the health club.

A refuge area should:

- Have appropriate signage, preferably with internal illumination.
- Have a two way communication system for disabled people to be able to communicate with the central control room. The communication system should be installed between the heights of 800mm and 1000mm from the furnished floor surface.
- Have assistive evacuation equipment such as evacuation chairs and stretchers.

Fireproof Evacuation Lift/ Elevator

In the event of an emergency, a fireproof evacuation elevator that works safely in the event of a fire can prove to be a life saving provision for persons with mobility impairments. These lifts also enable fire-fighters and hotel staff, who may be manually screening the premises to rescue unconscious guests, to get to other floors quickly.

Doors

Fireproof doors generally require a force greater than 25 Newtons to operate, rendering several disabled people dependent on others to negotiate these doors. While it is essential to cater safety measures for unpredictable emergencies, it is also important to provide an accessible environment to disabled guests. Consider holding the doors open with magnetic catches or 'floor springs' that are connected with the fire alarm system.

Summary

- Alarm switches should contrast visually from the background wall and be installed between heights of 800mm and 1000mm from the floor level.
- Emergency alarms should have a visual and audible output.
- Consider installing non-auditory alarms such as flashing beacons, vibrating pillows or issuing vibrating pagers that are lined with the emergency alarm to guests at the time of checking into the hotel.
- An evacuation plan, detailing the evacuation procedure for disabled guests, should be installed in accessible guest rooms and at all other facilities that the guest may visit. This plan should be in large print format with the evacuation route represented in the form of a tactile map.
- Emergency evacuation routes for disabled guests should offer a step free and unobstructed path that is at least 1200mm wide.
- A 'way-guidance lighting system' should outline the entire length of the exit route.
- Internally illuminated directional signage should be installed at regular intervals along the evacuation route.
- Provide refuge areas that can accommodate at least two wheelchair users simultaneously on all floors above the ground level. Refuge areas should be equipped with an 'evacuation chair' and a two-way communication system that is linked with the central control room.
- Consider installing a fire proof evacuation elevator.





Finishes

Exterior and Interior Doors with Hardware

- The prominence and visual relationship of the door with its surroundings;
- Angle and width of approach to the door;
- The type of threshold needed to allow convenient wheelchair manoeuvring;
- The ease of operation of the principal entrance door;
- The minimum effective clear width through the doorway.

Visual Clarity

The principal entrance door should contrast visually with its immediate surroundings and should be well lit and have clear signage. The door and the surrounding wall should contrast adequately, in tone and colour, with each other.

Approach to Doors

All public passageways that lead to doors in the restaurant or dining room, lounge, bar and the disabled guest's bedroom should be at least 1200mm wide while the passageways inside the disabled guest's bedroom should not be less than 900mm wide opposite the doors.

The direction and angle of approach from the access route must also be taken into consideration while installing doors as this has an impact on the manoeuvring space needed to negotiate the doorway. As general guidance, where direction of approach to the door requires turning at a right angle, the approach path should not be less than 1000mm wide and the clear opening width of the door should be at least 950mm.



It is an example of poor visual clarity.



Opening Width

The clear opening width of an entrance door should be greater than 900mm. Where double leaf doors are used at least one of the leaves should have a clear opening width of 900mm. When specifying a door size, take into account the extent to which the door will actually open, allowing for the projection of the door furniture or wall configuration. For example, some doors may not open beyond 90° due to obstruction caused by projection of the door closure mechanism, as depicted in the adjoining photograph. Standard revolving doors and turnstiles should not be used as wheelchair users cannot negotiate these.

Wheelchair Manoeuvring Space

The space into which the door opens should be un-obstructed on the side next to the leading edge for at least 300mm, unless the door opens automatically, or it is reasonable to anticipate assistance.

Door Closures

The door closers should be adjusted to the minimum force necessary to open the doors. For disabled people to have independent access through single or double swing doors, the opening force, when measured at the leading edge of the door, should be not more than 25 Newtons from 0° (the door in the closed position) to 30° open, and not more than 22 Newtons from 30° to 60° of the opening cycle. A regular maintenance contract should be set up to ensure that the door closers are checked at regular intervals.

Glass Doors

Glass doors should be clearly distinguishable particularly for visually impaired people. This can be achieved by detailing, the use of a colour strip or other features (manifestation). However, the manifestation chosen must be clearly visible with the background against which it will be viewed. This applies equally during the day, at night or under artificial lighting.

Thresholds

Door thresholds should be flush to avoid the danger of a person tripping up when entering or leaving a building. Where thresholds are unavoidable, they should not be higher than 15mm and must be beveled.

Door Hardware

Door fittings must be easy to identify and use. Lever handles are preferred because they are easier to grip and turn than round knobs. Door handles should be located between 900mm and 1100mm above floor level.



The accessible facility has a knob type door opener making it inaccessible

Fire Resistant Doors

Fire resistant doors and doors used along the emergency evacuation route are generally heavy and the force required to open these is much higher than 25 Newtons, making it difficult for disabled people to negotiate these doors independently. There are, however, magnetic and other types of door holders available that can be connected to fire alarms so that they will hold the doors open normally but will release the doors when the fire alarm is activated.

Signage

Where possible, and at least in the disabled guest's room and in toilets in the lobby, signage that incorporates raised letters and Braille should be installed on the wall adjacent to the door (not the door), between a height of 1400mm and 1700mm from the furnished floor surface, to aid recognition by people with vision impairments. These signs are always read close up and it is essential that they are clear, brief and unambiguous, and should preferably involve clear pictograms of the facility.

Door entry systems

Where door entry systems are installed they should be located on the latch side of the door with the activation pad positioned within 200mm of the door frame (or aperture where there is a glazed façade), at a height of between 750mm and 1000mm from the finished floor level.

Summary

- Doors should contrast visually from the immediate surroundings, such as the door should contrast in colour from the surrounding wall.
- All doors should provide a minimum clear opening width of 900mm.
- Where direction of approach to a door requires turning at a right angle, the approach path should be at least 1000mm wide.
- An unobstructed wheelchair manoeuvring space that is at least 300mm wide should be available on the side next to the leading edge of the door.
- Door closures should be adjusted so that the doors do not require an opening force of more than 22 Newtons.
- Glass doors should be marked with colour strips or other manifestations.
- Thresholds should be avoided and, where unavoidable, these should not exceed 15mm in height and must be beveled.
- All door operating hardware should contrast in colour from the door and be installed between the heights of 900mm and 1100mm from the floor level. Lever handles are preferable to round knobs.
- Room numbers and other signage should not be installed on the door but on the adjacent wall between heights of 1400mm and 1700mm from the floor surface. The signage should incorporate raised letters and, where possible, Braille.



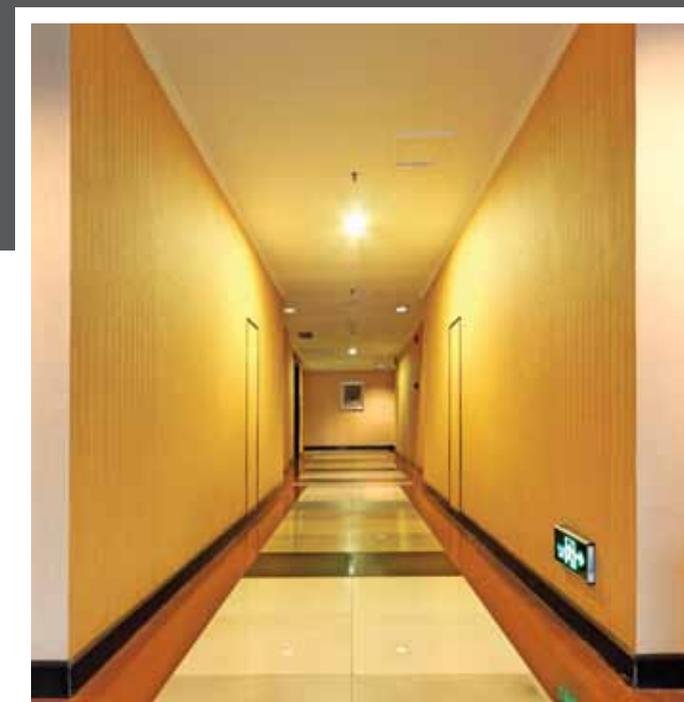
Floor Finishes

Characteristics of floor finishes that affect the degree of accessibility rendered:

- Uniformity
- Slip potential (coefficient of friction)
- Glare index
- Sound absorption
- Textures
- Climate factors (for external surfaces)

Surface finishes should generally be smooth and uniform, avoiding any abrupt changes in texture, reflection index or levels. Choosing the floor finishes and their layouts appropriately can enhance accessibility for disabled guests. Surface materials can offer different sound qualities and textures as an aid to locating the route. Points to consider here are:

1. Persons with vision impairments tell different areas apart easily if they have differently textured floor finishes that also contrasts in colour from each other.
 - The floor surfaces next to entrances, internal doors, ramps, stairs and any other unavoidable permanent fixtures in the circulation route (such as pillars and lobby centre pieces) should be different from the rest of the surrounding areas, in colour and texture, to highlight the desirable features.
 - For large open and plane areas, consider defining routes with contrasting floor finishes and textures. Having the floor finish of the restaurant or the bar in a different texture and colour from the connecting corridor or lobby will help in their recognition.
 - Surface materials for stairs and ramps should be of a different texture and contrast visually with the landings.
 - Highly contrasting coloured strips may be laid in back offices, along the access corridors and emergency escape paths, to enhance the mobility of staff with vision impairments.
2. Where different materials are to be used for demarcating areas e.g. ramps, landings and approaching paths, it is important to ensure that the coefficients of friction are similar to minimise the risk of stumbling, especially for people with impaired mobility, such as the ones using crutches or other mobility aids.



3. Avoid too many patterns or textures on floor finishes and carpets, as these tend to confuse people with vision impairments and those with cognitive disabilities. Floor surface finishes with patterns that could be mistaken for steps or changes in level should be avoided.
4. Acoustic qualities of surfaces, such as sound absorption, become imperative when choosing floor finishes for lobby areas and conference halls/ meeting rooms, as these can enhance or diminish independence of guests with hearing impairments.
5. Surfaces that are highly reflective, especially when polished, have an adverse affect on people who can not withstand glare. This factor should be given utmost consideration when deciding floor finishes for the lobby. Moreover, reflections can mislead people, particularly those who are visually impaired.
6. Whilst the surface finish should be as smooth as possible to prevent tripping hazards and to provide an easy travel surface for wheelchairs; it must also be slip resistant, especially when spillage occurs.
 - Cobbles, bare earth, sand and loose gravel should not be used on external approach paths, such as the route from accessible parking to the hotel entrance,
 - For external ramps, slip resistant surfaces can be formed using several slabs of concrete or a similar base covered with an applied slip resistant coating (like paint, grit in an epoxy carrier etc.).
 - The surface of an internal ramp should be covered with a slip resistant vinyl or rubber flooring which will provide the confidence for a disabled person to use the ramp.
 - It is also important to ensure that regular cleaning and polishing do not produce a slippery surface.
7. If floor surfaces are carpeted, they should be firmly fixed with no loose edges, so as not to provide a tripping hazard for ambulant disabled people or people who are visually impaired. Deep piled carpets should be avoided.



This picture shows a highly polished floor surface that creates a lot of reflection and problems for persons with vision impairments



The cobble stones may be slip resistant but pose inaccessibility to person with physical impairments

Table: Potential for slip of dry/unpolished and wet surfaces

Material	Potential Dry & Unpolished	for slip Wet	Remarks
Carpet	Extremely low	Low	Loose or worn carpet can present a trip hazard
Cast iron	Low	Moderate to low	If open treads are used, the potential for slip can be low in wet conditions
Ceramic tiles (glazed & highly polished)	Low	High	-
Ceramic tiles (matt)	Low	High	Wet slip resistance is dependent on surface roughness. An Rz (din) value of greater than 10 µm is recommended for use in clean water wet areas
Clay pavers	Low	Moderate to low	-

Clay tiles	Low	Moderate to low	When surface is wet and polished, the potential for slip can be very high
Clay tiles (carborundum finish)	Extremely low	Extremely low	May be suitable for external stairs
Clay tiles (textured)	Extremely low	Low	May be suitable for internal stairs
Concrete	Low	Moderate to low	If textured finish or a non-slip aggregate is used, potential for slip can be low
Concrete (powerfloat finish)	Low	Moderate	Surface dust may cause problems particularly on new floors
Cork tiles	Extremely low	Low	-
Float glass	Extremely low	High	Various techniques can be used to modify the surface of float glass, thus improving the wet potential for slip. Expert advice should be sought
Granolithic	Low	Moderate to low	Slip resistant inserts are necessary whenever granolithic is used for stair treads. Polished granolithic should not be used for stair treads
GRP profiles (chequer plate)	-	Low	Class determined by ramp method, water-wet with shop feet. No dry value determined.
Linoleum	Low	Moderate to low	Edges of sheet liable to cause tripping if not firmly fixed to base
Mastic asphalt	Low	Low	-
Profiled ceramics	Low	Moderate to low	Profiled ceramics are suitable for use in barefoot areas.
PVC	Low	High to moderate	Ex-factory classes for PVC should be treated with caution. The installed floor is unlikely to be suitable for use in wet conditions.
Resin, smooth self-leveling	Extremely low	High to moderate	-
slip resistance	Extremely low	Resin, enhanced Low	The anti-slip properties depend upon sufficient, uniformly distributed aggregate. Areas of reduced aggregate can present a serious slip risk.
Rubber (sheets or tiles)	Extremely low	High	Not suitable near entrance doors or other foreseeable wet areas.
Rubber (smooth & ribbed)	Low	High	-
Stainless steel	Low	High	Wet slip potential is highly dependent on surface finish. Quoted values for 0.5 µm Rz (din) surface roughness.
Steel profiled (diamond plate)	-	Moderate	Class determined by DIN ramp method. No dry value determined.
Terrazzo	Low	High to moderate	Slip resistant inserts are necessary whenever terrazzo is used for stair treads. Polished terrazzo (including resin based) should not be used for stair treads.
Timber (finished)	Extremely low	High	Applies to sealed, or varnished, or polished timber.
Timber (unfinished)	Low	Moderate	-

Summary

- Floor finishes should be even, smooth and uniform.
- Avoid reflective and slippery surfaces.
- Combinations of floor finishes with different textures should be used to aid persons with vision impairments to identify and differentiate the various areas, and to warn them of approaching hazards.
- Avoid heavy patterns or textures on floor finishes and carpets.
- Glare index, coefficient of friction and acoustic properties of surfaces should be considered when choosing floor finishes.

Signage

Signage is an important element in a building and provides various kinds of communication to visitors in a space. Signage that is effective benefits everyone. It also enables people with visual and hearing impairments and people with learning difficulties to use the environment as independently as possible. Signage provided at the right place reduces the effort required in wayfinding for guests, visitors and staff.



Directional

Enable people to find destinations and often include arrows or other directional text. In large buildings they may contain more than one location and care should be taken to ensure that the directional arrows are easily read.

Information

These are the signs that people use to orientate themselves when they first reach a building: name sign, car park, entrance and the main locations within the buildings.

Identification

These are used for individual locations and usually indicate a particular room or service.

Instructive

Provide instructions on how to use the space. Health and safety – These include essential signs such as fire exits, warning signs etc.

Good Signage Tips:

- In a sans serif font
- Large enough to see at a distance
- Ranged left for ease of reading (if a directional arrow pointed left it would be ranged right)
- Directional arrow near enough to follow easily
- Good colour contrast
- Signage must be clear, concise and consistent.
- The information provided must be well thought through and precise.



Directional Signage



Identification Signage

The Language of Signs

What is said on a sign and how it appears is very important.

- Words used should be readily understood;
- Abbreviations must be avoided
- Be consistent with the terminology;
- Only give as much information as is needed at that point in time – supplementary signs can be used further along the route if necessary;

But also ensure that the meaning is conveyed and not misleading through trying to make the sign too concise. At times, signs may be misleading because of the language or symbol used.



Informational Signage

Sign Style

- Capitals and lower case should always be used. The use of all capitals can cause difficulty in reading quickly for many people. (The exception of course is for the traditional well recognised: EXIT, TAXI etc);
- Typefaces should always be sans serif: such as Helvetica Medium, Ariel, Avant Garde, Futura;
- Try not to use full stops or commas, if you have names on signs print them out as: Dr K Singh
- Sometimes symbols can be used instead of words such as for first aid, no smoking, and recognised symbols for disability;
- Arrows are always useful but ensure they are the right type; ISO 7001 recommend using arrows whose ends are parallel with the main stem. Avoid arrows that have a short tail, are thin so making them difficult to see and shaped arrows that are not immediately recognisable;



Instructive Signage

Always avoid:

- Italics or scripts;
- Exaggerated typefaces;
- Very bold typefaces where the white space inside letters disappears;
- Too much information on a sign;
- Lots of different typefaces on a sign.

Colours

Colour of the sign makes little difference to a sighted person but it is of significant consequence to people with vision impairments. Equally important is whether signs are embossed or rendered in Braille

Color used	Reverse colour	effectiveness
Signage	Signage	Good colour contrast
Signage	Signage	Good colour contrast
Signage	Signage	Poor colour contrast



Picture of tactile signage with contrasting colour

Size of Signs

Viewing Distance	Size
Up to 7mm	60mm x 60mm
7mm – 8mm	100mm x 100mm
Exceeding 8mm	200mm x 200mm to 450mm x 450mm

Size of Letters in Signs

Viewing Distance	Height of letters
2000mm	6mm
3000mm	12mm
6000mm	20mm
8000mm	25mm
12000mm	40mm
15000mm	50mm
25000mm	80mm
35000mm	100mm
40000mm	130mm
50000mm	150mm

Embossed signs

These signs are always read close up and it is essential that they are clear, brief and unambiguous. They should be positioned between a height of 1400mm and 1700mm. The text should be embossed within a range of 1 to 1.5mm and never engraved.

Signage must be provided on the left side of the wall and not the door as the door can be often open and thus the signage missed

- Numerals are better to recognise than using words and take up less space;
- The spacing between lines is very important. Visually impaired people need more clear space to read something easily, so ensure that the text is not too close together;
- Highly polished or reflective material should be avoided to reduce glare;
- Braille and embossed signs for visually impaired people should be provided;
- Care should also be taken with arrows to ensure that there is not too much space between the words and the arrow, which would make visual alignment difficult.



Embossed signs

Where should they be placed?

General directional signs: these should be placed between heights of 1400mm and 1700mm from the furnished floor surface. They should be repeated along any long lengths of travel and at any intersection.

Hanging signs

Signs that are placed at right angles to the wall or hanging from the ceiling, the bottom of the sign should be 2300mm from the floor level.

Floor Level indicator signs

These should be placed 1400mm from the bottom of the sign, opposite lifts, on stairwells and opposite doors from stairwells.

Reception desks

These should be preferably at the front of the desk for wheelchair users and either suspended from the ceiling or at 1400mm from the floor level.

Lifts/ toilets etc

In a large building it is useful if signs immediately outside the facility are placed at right angles to the wall for easy recognition. This is supplementary to the signage leading to the facility and the usual signage on doors.



Picture of a hanging sign

Summary

- In a sans serif font, font size relative to viewing distance.
- Use 'Title Case' (not 'Sentence case' or 'UPPERCASE')
- Ranged left for ease of reading (if a directional arrow pointed left it would be ranged right)
- Directional arrow near enough to follow easily
- Good colour contrast
- Signage must be clear, concise and consistent
- The information provided must be well thought through and precise
- Incorporate raised letters and standard pictograms

Lighting

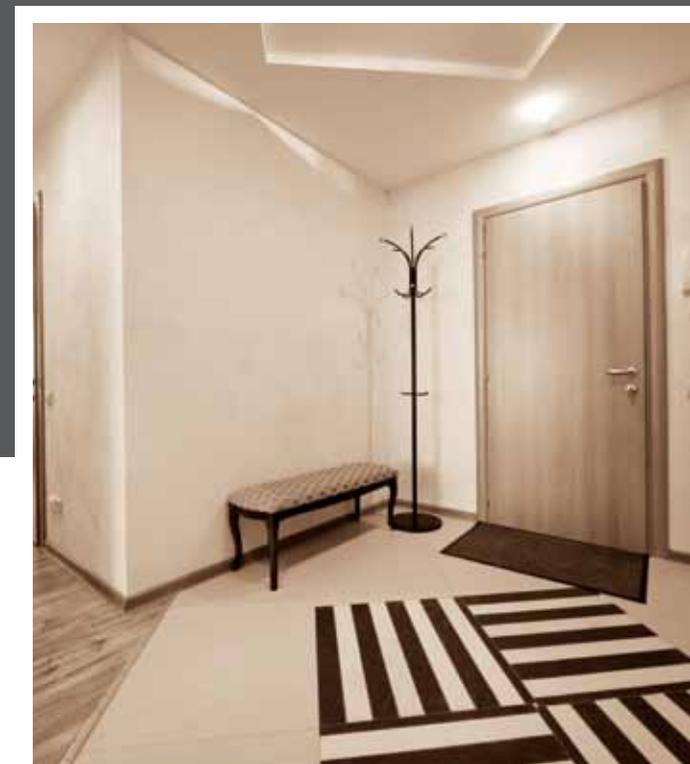
Provision of adequate general lighting and contrasting environmental features so as to highlight them against their background are two essential design features that must be incorporated adequately for persons with vision impairments to use the premises independently and comfortably. Providing adequate lighting for people with visual impairments will normally ensure that the basic needs of all users are met.

Illumination

In order for lighting design to be effective, it should provide adequate illuminance.

The relevant recommendations from British Standard EN 12464-1 and Lighting Guide 5 (produced by Society of Light and Lighting, UK) are as follows:

Area	Maintained	Limiting Illuminance	Minimum Glare Rating	Colour Rendering (Ra)
Entrance halls, Lobby		200 lux	22	80
Reception Desk		300 lux	19	80
Circulation areas, Corridors		100 lux	25	80
Stairs, Ramps		150 lux	25	80
Gymnasium, Swimming Pool		300 lux	22	80
Restaurant, Cafe		200 lux	22	80
Conference Rooms		300 lux	19	80
Business Centre		300 lux	19	80
Computer Workstations		300 lux	19	80
Kitchen		500 lux	22	80



The following general points should be considered with regard to lighting;

- Sudden changes in illuminance should be avoided to prevent adaptation difficulties.
- Ensure that stairs, ramps and slopes are lit so that they can easily be identified when approaching in either direction.
- Localised lighting for specific tasks may normally be better than increasing the overall illuminance necessary for all tasks in a multi-use area.
- Minimum requisite illuminance should be provided and it should be uniform. Care should be taken to minimise glare.
- Visibility and comfort are compromised when light fixtures are placed too far apart, creating non-uniform patterns of light and dark on the floor and walls. The areas with non-uniform patterns of light and dark, such as in the adjoining photograph are disorientating for persons with vision impairments.
- Just as important as the lighting itself, is the choice of décor and ensuring that there is colour and luminance contrast between different areas. To assist colour discrimination, the colour rendering index of the light source should be at least Ra80, the recommendation for most interiors, and where feasible, lamps of Ra90 should be used.
- Most users, including those with visual impairments, prefer natural lighting providing it does not create problems of glare.
- Light coloured surfaces have a relatively high reflectance allowing light to flow around a space. Dark surfaces have the opposite effect and redecoration with darker colours can reduce illuminance and luminance. Light and dark surfaces will add interest to a space and may also provide adequate contrast to allow people with visual impairments to identify junctions between surfaces, as shown in the figure on the adjoining photograph.



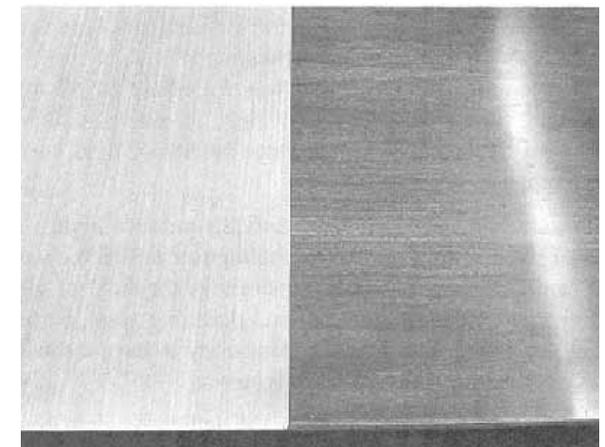
Non uniform lighting creating light and dark patches can be disorienting to persons with vision impairments

Summary

- Maintain adequate and uniform lighting levels as indicated in the following table:

Area	Maintained Illuminance
Entrance Halls, Lobby	200 lux
Reception Desk	300 lux
Circulation Areas, Corridors	100 lux
Stairs, Ramps	150 lux
Gymnasium, Swimming Pool	300 lux
Restaurant, Cafe	200 lux
Conference Rooms	300 lux
Business Centre	300 lux
Computer Workstations	300 lux
Kitchen	500 lux

- Avoid non-uniform patterns of light and dark on the floors and walls.
- Avoid direct and reflected glare by selecting appropriate finishes and luminaries.
- Use lighting to highlight hazards and obstacles in the circulation path.
- Install luminaries that have a colour rendering index of at least Ra80



Light and dark surfaces

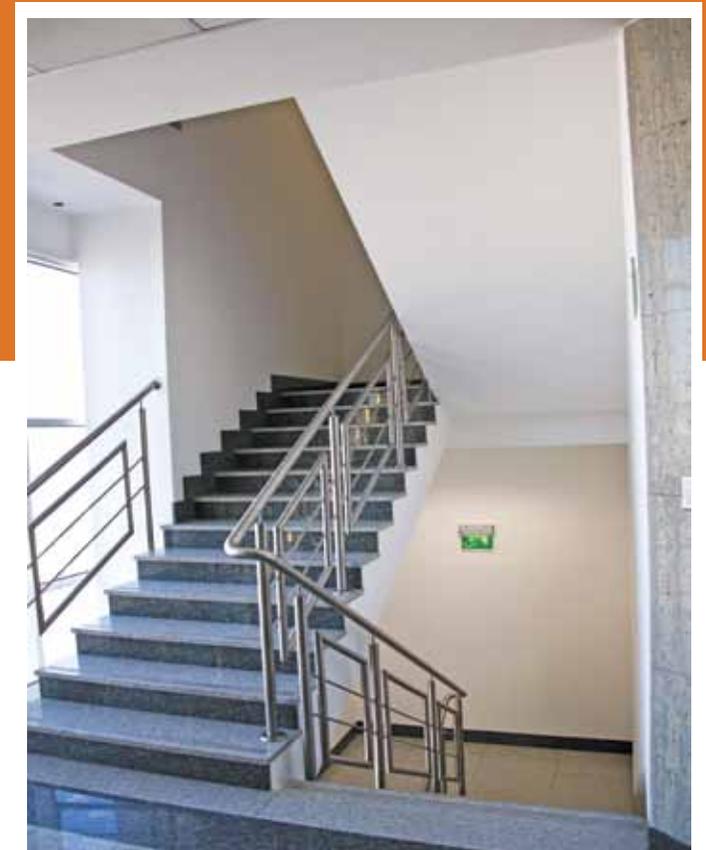
Colour and Luminance Contrast

Two colours that contrast sharply to someone with normal vision may be far less distinguishable to someone with a vision disorder. Persons with vision disabilities need colours to contrast sharply against the background for them to successfully identify the objects, walls and obstacles. Adequate 'visual contrast' is achieved by careful selection of surfaces and materials that not only contrast in colour but also have sufficient luminance contrast between them.

The way to ascertain adequate contrast is to use Light Reflectance Values (LRV). A LRV difference of 30 percent is required between surfaces/ objects for them to be distinguishable by most people with vision impairments. LRV figures can be easily obtained from most suppliers of paints and materials.

Some design guidelines to assist in the orientation and navigation of the visually impaired:

- **Critical Surfaces:** Walls should contrast from ceiling and floor.
- **Sudden changes in level:** Any sudden changes in levels should be marked with a contrasting colour from the level flooring to warn people with vision impairments.
- **Toilets:** The sanitary ware in toilets should contrast from the background as should the grab bars.
- **Stairs:** Nosings should be well contrasted from the risers and the treads so that people can easily distinguish between the steps.
- **Handrails:** Handrails on stairs, ramps and single steps should contrast from the background wall.
- **Doors:** Doors should contrast from the adjoining wall, door frames should contrast from both the door and the adjoining wall, and door hardware should contrast from the door.



- **Switches and sockets:** switches, sockets and other operable controls should contrast from the background.
- **Skirting:** Skirting should, unless it is intended to be used as a handrail, ideally be the same colour or harmonise with the colour of the wall.
- **Free standing obstacles:** Free standing obstacles such as pillars, furniture and bins should contrast from their background so that people with reduced vision are able to identify these as hazards.
- **Signage:** Text and symbols on the signage should contrast from the frame and the entire sign frame should contrast from the background.
- Contrasting textures can also be helpful, such as tactile markers that people can identify by feel. Tactile ground surface indicators commonly seen at the edges of railway platforms are a good example of this. Other examples include carpet matting on a vinyl floor surface and domed buttons on handrails to indicate that the end of the stairway or ramp is approaching. Whenever different textures are used, they should also contrast, in colour and tone, to the adjoining/ surrounding materials.



Switches and sockets



Edges of railway platform

Summary

- Adequate 'visual contrast' refers to a difference of at least 30 points in the Light Reflectance Value of the two surfaces/ objects.
- Ensure there is adequate visual contrast between:
 - Critical Surfaces (walls, ceiling and floor),
 - Toilet fixtures and critical surfaces in toilet,
 - Nosings and risers/ treads on steps,
 - Handrails and background walls,
 - Doors and surrounding walls,
 - Switches/ sockets and background wall,
 - Signages and background sign frame/ wall.
- Highlight obstacles and hazards by incorporating sufficient colour and luminance contrast.

