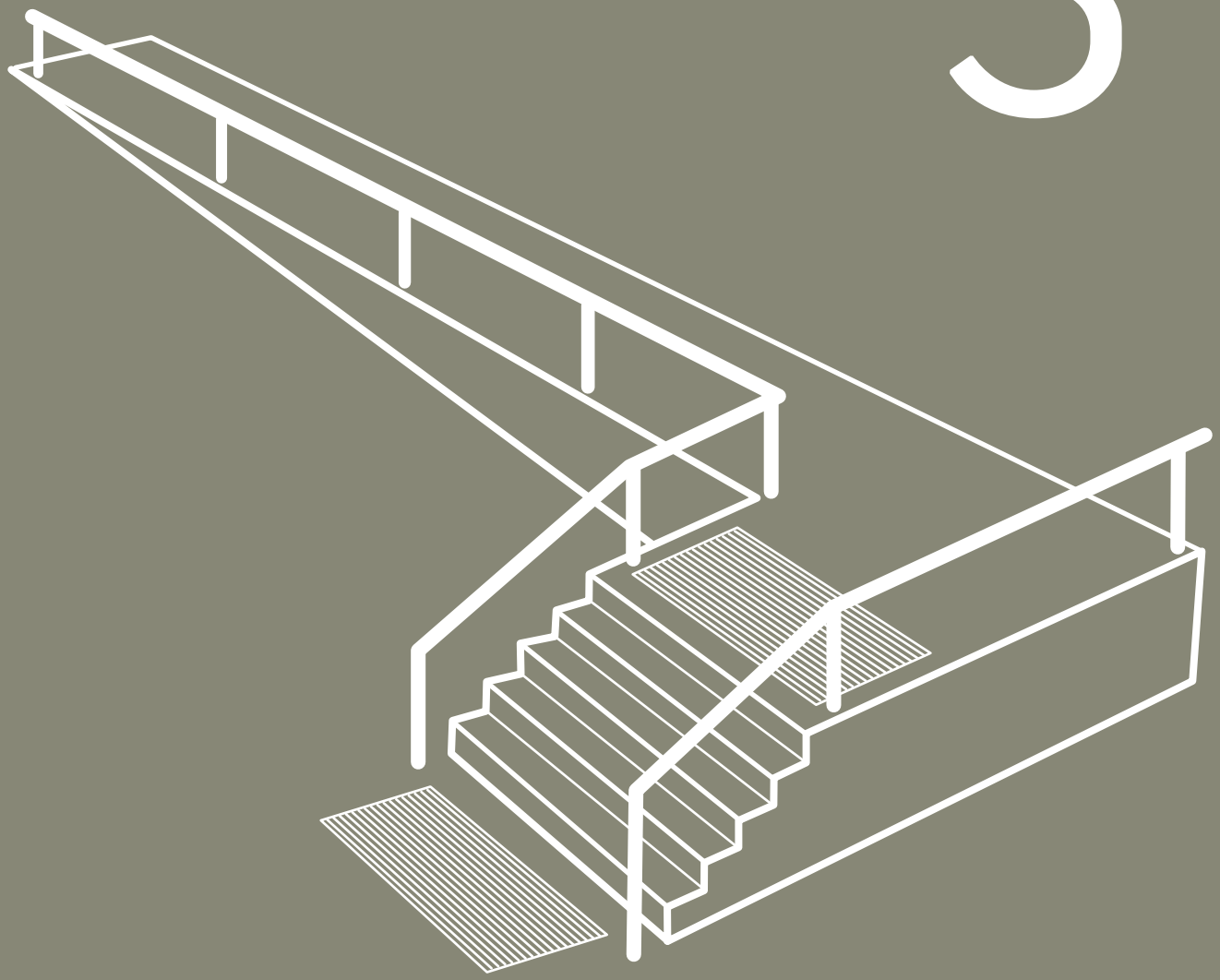
Building for Everyone:

A Universal Design Approach

Vertical circulation

3



Centre for Excellence in Universal Design

Creating an environment that can be used by all people, regardless of their age, size, disability or ability.

The National Disability Authority's Centre for Excellence in Universal Design has a statutory role to promote the achievement of excellence in universal design in:

- the design of the built and external environment
- product/service design
- information and communications technologies (ICT)
- the development and promotion of standards
- education and professional development
- raising awareness of universal design

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Building for Everyone

Booklet 3 - Vertical circulation

The other booklets from the
Building for Everyone series:

Booklet 1 - External environment and approach

Booklet 2 - Entrances and horizontal circulation

Booklet 4 - Internal environment and services

Booklet 5 - Sanitary facilities

Booklet 6 - Facilities in buildings

Booklet 7 - Building types

Booklet 8 - Building management

Booklet 9 - Planning and policy

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3.0 Objectives

The guidance in this booklet promotes the concept and philosophy of universal design and encourages developers, designers, builders and building managers to be innovative and think creatively about solutions that meet the needs of all building users regardless of their age, size, ability or disability.

The objectives of the series of booklets are to:

- identify and promote best practice with regard to universal design of the built and external environment
- provide best practice guidelines while recognising existing regulations in Ireland
- provide guidelines that are usable by and accessible to the target audience
- promote the achievement of universal design in Ireland

This booklet aims to:

- identify and promote best practice for vertical circulation such as stairs, ramps and lifts within buildings with regard to universal design
- increase awareness of, and encourage designers to identify, the needs of all those who require vertical access, routes and circulation within buildings in order to undertake daily activities
- To highlight the wider benefits experienced by all when accessible and universally designed features of vertical circulation within buildings are provided
- encourage designers to provide universal design solutions for the entrances and the horizontal circulation within buildings that look beyond the recommended requirements of national building regulations

3.1 Introduction

This booklet is part of the series "Building for Everyone – A Universal Design Approach" to provide practical guidance on the universal design of buildings, places and facilities.

Universal design places human diversity at the heart of the design process so that buildings and environments can be designed to meet the needs of all users. It therefore covers all persons regardless of their age or size and those who have any particular physical, sensory, mental health or intellectual ability or disability. It is about achieving good design so that people can access, use, and understand the environment to the greatest extent and in the most independent and natural manner possible, without the need for adaptations or specialised solutions (see full definition in **Appendix A1**).

Why universal design?

People are diverse - some are left-handed and some right-handed - and people vary in their age, size and functional capacities. Illness or disability (whether temporary or permanent) can also affect characteristics such as a person's mobility, dexterity, reach, balance, strength, stamina, sight, hearing, speech, touch, knowledge, understanding, memory, or sense of direction. A reference list with these booklets indicates some of the key differences in human abilities that should guide design of buildings and of outdoor places. (See full description of Human Abilities in **Appendix A2**).

People of diverse abilities should be able to use buildings and places comfortably and safely, as far as possible without special assistance. People should be able to find their way easily, understand how to use building facilities such as intercoms or lifts, and know what is a pedestrian facility and where they may encounter traffic.

Given the wide diversity of the population, a universal design approach, which caters for the broadest range of users from the outset, can result in buildings and places that can be used and enjoyed by everyone. That approach eliminates or reduces the need for expensive changes or retro fits to meet the needs of particular groups at a later stage.

It is good practice to ascertain the needs of the range of expected users as early as possible, and to check the practicality and usability of emerging designs with a diverse user panel.

Designing for one group can result in solutions that address the needs of many others. For example:

- level entry (Step-free) entrances facilitate not just wheelchair users but also people with buggies; people with suitcases or shopping trolleys; people using walking or mobility aids; and people with visual difficulties
- larger toilet compartments provide easier access to wheelchair users; those with luggage or parcels; parents with pushchairs or accompanying small children; those using walking or mobility aids; and larger-sized people.
- clear, well-placed signage that uses recognised symbols or pictograms helps people with reading or cognitive difficulties, and those whose first language is neither English nor Irish

Sometimes one solution will not suit all and a range of options will need to be provided. For example:

- providing both steps and a ramp where there is a change in level
- providing parking ticket machines that offer slots at different heights to facilitate use at standing height, sitting height, and by people of small stature.

This series of booklets is for architects, engineers, planners, developers, designers, building contractors, building workers, building managers and others involved in designing, commissioning and managing buildings and their surroundings. It provides guidance on a universal design approach to all new buildings, and the use and adaptation of existing environments.

Those who commission, design, construct or manage any part of the built and made environment also have a duty of care to adhere to relevant legislation and regulations including equality legislation, building regulations and health and safety regulations.

The guidance is based on a best practice approach drawing on up-to-date international best practice; guidelines and standards; previous guidance by the National Disability Authority; and extends beyond disability access matters to incorporate a universal design approach. The series is fully compatible with Part M (2010) of the Building Regulations and associated Technical Guidance Documents related to Part M.

A disability access certificate is required for new buildings other than dwellings (including apartment buildings) and certain other works (as set out in Article 20 D (1) of SI 351 of 2009) to which the Requirements of Part M of the Building Regulations apply, which commence or take place on or after 1 January 2012. Further details on these and other relevant standards, codes of practice and professional codes of practice are listed in **Appendix A3** Further Reading.

The detailed guidance provided here does not represent the only possible solution. Designers may come up with other ways to meet a diversity of users. New materials and technologies that emerge may open up further possibilities of accommodating the diversity of the population.

Checklists are provided throughout the series and while they provide a summary of main considerations and technical criteria, they should not be regarded as a substitute for the main text or an exhaustive list.

A comprehensive **index** is also available for the suite of booklets.

The Building for Everyone series is available online at **www.nda.ie** and **www.universaldesign.ie**. Electronic links are provided to relevant sections in the different booklets. As standards and requirements develop, the electronic versions of these booklets will be updated.

The electronic version is produced in accessible PDF format, in accordance with the Web Content Access Guidelines 2.0. If you have any difficulties in this regard or require the document, or particular sections, in alternative formats, please contact the Centre for Excellence in Universal Design at the National Disability Authority, **info@ceud.ie** or (01) 6080400.

3.2 Terminology

Accessible – Facilities that are designed to be accessible and understandable to all users of a building or external environment.

Building – A permanent or temporary structure of any size that accommodates facilities to which people have access.

Building user – A person regardless of age, size, ability or disability using facilities in a building or associated external environment.

Clear width – The width between handrails.

Dog-leg/Switch back stairs – Configuration of stairs between two floors of a building, often a domestic building, in which a flight of stairs ascends to a half-landing before turning 180 degrees and continuing upwards. The flights do not have to be equal, and frequently are not.

Escalator – A moving stairway.

Evacuation lifts – Lifts designed to continue operating in the event of a fire, which have special design features to ensure safety.

Fillet – A decorative filler piece on the floor between balusters.

Inclined platform stairlift – A stairlift incorporating a fold-down platform for wheelchair users and support rails that follows the incline of a stair. Also termed wheelchair stairlift and platform stairlift.

Kerbed upstand – Strip used to form a raised edge (for example 150mm high) at floor level.

Nosing – An edge part of the step tread that protrudes over the riser beneath in a flight of stairs.

Passenger lift – A conventional motorised lift enclosed within a structural shaft and rising one or more storeys within a building. Lift and door movement is automatic.

Refuge area – Areas within a building, separated by fire-resisting construction and provided with a safe route to a storey exit, where people with mobility difficulties can await assistance for their evacuation.

Riser – The vertical portion between each tread on the stair.

Stairlift – A device mounted on a support rail that follows the incline of a stair and incorporates either a seat with footrest (chairlift) or standing platform and perch (perching stairlift). Stairlifts are designed for domestic use only. Also termed chair stairlift and domestic stairlift.

Travelator – A moving walkway designed to transport people quickly over a long distance in large buildings. Travelators are usually level, but may have a slight incline where a vertical change in level is also required.

Tread – The part of the stairway that is stepped on.

Vertical platform lift – A guarded platform that travels vertically and is designed to accommodate one wheelchair user and one companion. Vertical platform lifts do not require a structural shaft, but are required to be enclosed if they rise more than 2000mm. Also termed vertical lifting platform; vertical-rise platform lift; short-rise platform lift (up to 2000mm rise); enclosed platform lift; hydraulic platform lift; and scissor lift.

3.3 Design Issues

Vertical circulation in a building comprises distinct components including stairs, ramps, lifts, platform lifts, and escalators.

Each component provides a viable means of access between different levels within a storey or between floors in a multi-storey building, but a mix is required in order to meet the needs of all building users and to take account of different ages, sizes, abilities or disabilities.

Escalators are not suitable for wheelchair users; people with strollers and buggies; those who use walking or mobility aids; and people with guide or pet dogs.

Stairs are not suitable for wheelchair users; people with buggies or strollers; and those using walking or mobility aids.

Platform lifts are slow-moving and have limited occupancy.

Ramps with a significant rise can be so long that they become impractical and too tiring for many people to use.

Mechanical devices such as passenger lifts and platform lifts may be unsuitable for use in an emergency. In these circumstances, an alternative means of access and suitable management procedures will be required.

A recurring theme throughout this booklet is the need to ensure individuals can use facilities independently. There is no ‘one size fits all’ and there will always be a need to provide alternatives to meet the needs and preferences of all building users, and to safeguard occupants in an emergency.

People should be able to freely and easily move around a building. They should not have to ask permission to use a lift, or have to locate a key in order to operate a platform lift.

Stairs and ramps that offer an alternative route to lifts or escalators should be easily found or clearly signed so that people do not have to ask for directions or be delayed by having to search for a different route.

All methods of vertical circulation in a building should link with horizontal access routes and key facilities. Although covered in separate booklets, horizontal and vertical circulation are integral. Well-designed circulation routes contribute to the creation of a logical building layout that is easy for everyone to understand and access.

3.4 Vertical Circulation

Changes of level within a storey should be avoided in new buildings. In existing buildings, where there is an existing change in level that cannot be eliminated, people should be offered the choice of using steps or a ramp. Where the change in level is high and the installation of a ramp is not practical, the provision of a passenger lift or vertical platform lift should be considered.

Irrespective of the means of vertical circulation, safety is of paramount importance.

Stairs, while the most common means of changing level, can give rise to risk of serious injury following falls. In many buildings that incorporate lifts, the stairwells might never be used at all in the day-to-day operation of the building. It is essential, however, that the stairs be designed, detailed, and maintained in a manner that will ensure they are safe for everyone in the event of an emergency.

The provision of a passenger/evacuation lift (or lifts) to all floors in a building will provide the most convenient and safe means of access and egress for building users. Passenger/evacuation lifts should be sufficiently large, have adequate circulation space on landings and controls that are easy to use, as described in **Section 3.7 and 3.8**.

Suitable passenger lifts will enable everyone to access all parts of a building smoothly and independently. In many cases, the provision of passenger lifts is a requirement under legislation, but it is good practice to provide them even when they are not mandatory.

EN 81-70:2003 (IS EN 81-70:2003) 'Safety rules for the construction and installation of lifts. Particular applications for passenger and goods passenger lifts. Accessibility to lifts for persons including persons with disability.' Passenger lifts will make the building usable for more people, more adaptable, and suitable for letting to different tenants during the building's lifetime.

In some existing buildings, it may not be possible to install a lift due to spatial or structural constraints. In such situations, the provision of a vertical platform lift

may be beneficial in that it provides an alternative means of access to stairs, see **Section 3.9.1 and Section 3.9.2**.

Some existing buildings may have a lift that is smaller than current best practice and it may not be feasible to install a new one or to increase the size of the existing structural shaft. In these circumstances, the potential to improve the lift controls, signalling system, safety and communication devices, and surface finishes should be considered, as these will improve accessibility for building users.

Checklist – Vertical circulation
• Avoid changes of level within a storey for new buildings.
• Design and maintain stairs to provide safe access at all times even if rarely used.
• Install passenger lifts in preference to other devices, as they provide the most convenient means of vertical circulation.
• Consider improving controls, signalling, safety and communication devices, and surface finishes in existing lifts.

3.5 Internal Stairs

3.5.1 Design and dimensions of internal stairs

Stairs should be safe and easy for everyone to use. They should be clearly visible and easy to identify. Spiral stairs and stairs with tapered treads should not be used, as they are much more likely to cause tripping.

The dimensions of each step should be consistent throughout a stair flight. The rise of internal steps should be in the range 150mm to 180mm. The going (depth) should be in the range 300mm to 450mm.

The profile of steps should be in accordance with **Figure 3.1**. Steps without projecting nosings are preferred, but if a projection is required, the riser face should be chamfered to an angle of at least 60 degrees and the overlap limited to 25mm. The leading edge of each step may be bevelled with a radius not exceeding 10mm.

Projecting nosings that have an underside perpendicular to the riser face should not be used as these present a trip hazard, particularly to people who ascend steps by sliding their feet up the surface of the riser. Where this already exists on stairs, a fillet can be added to the underside of the projecting nosing to reduce the tripping hazard.

All step risers should be solid. Open risers can be a source of visual confusion and are disconcerting for many people to use.

Figure 3.1 Step nose profile.

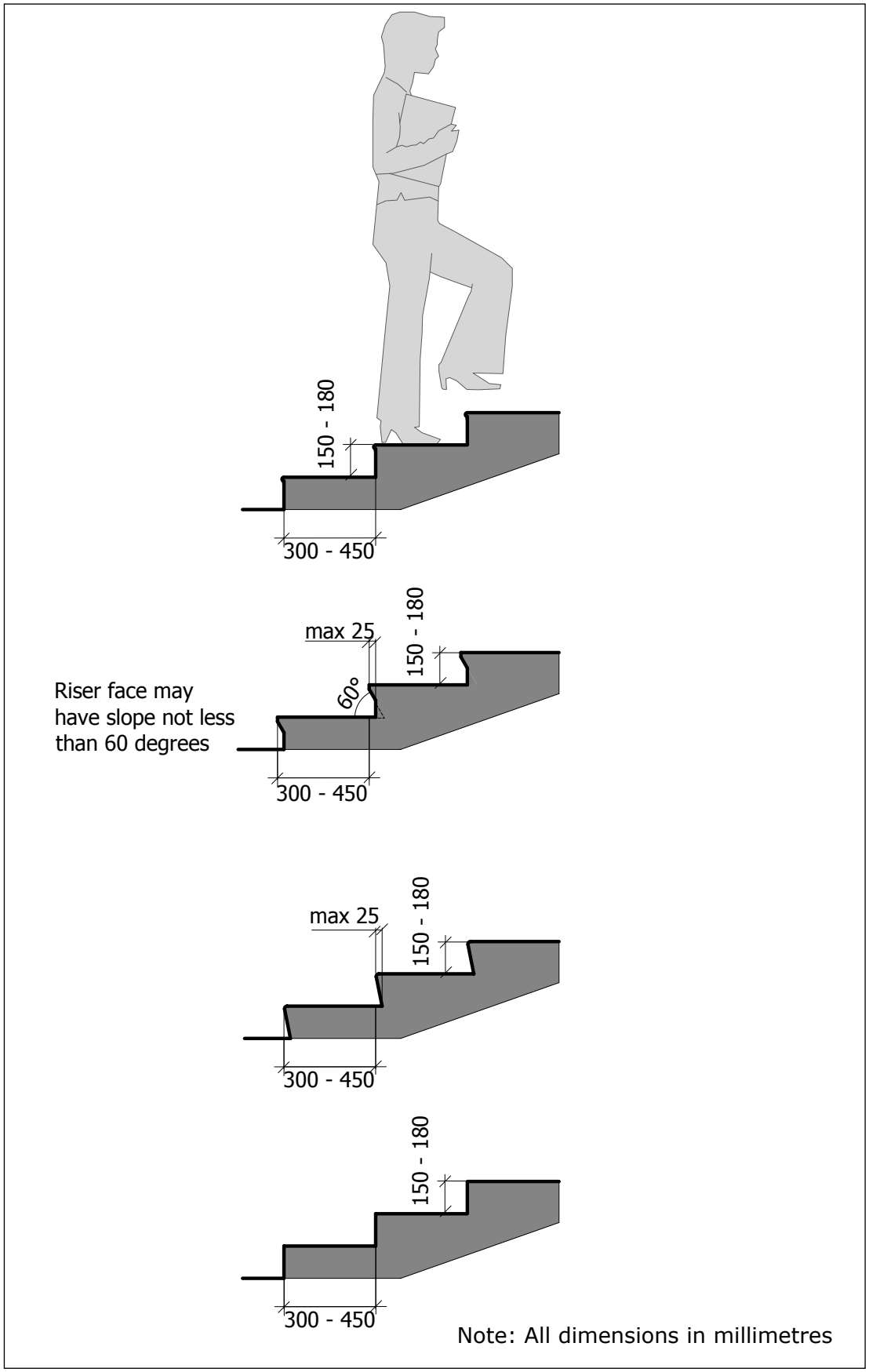


Image 3.1 Example of stairs with non-slip applied nosing.

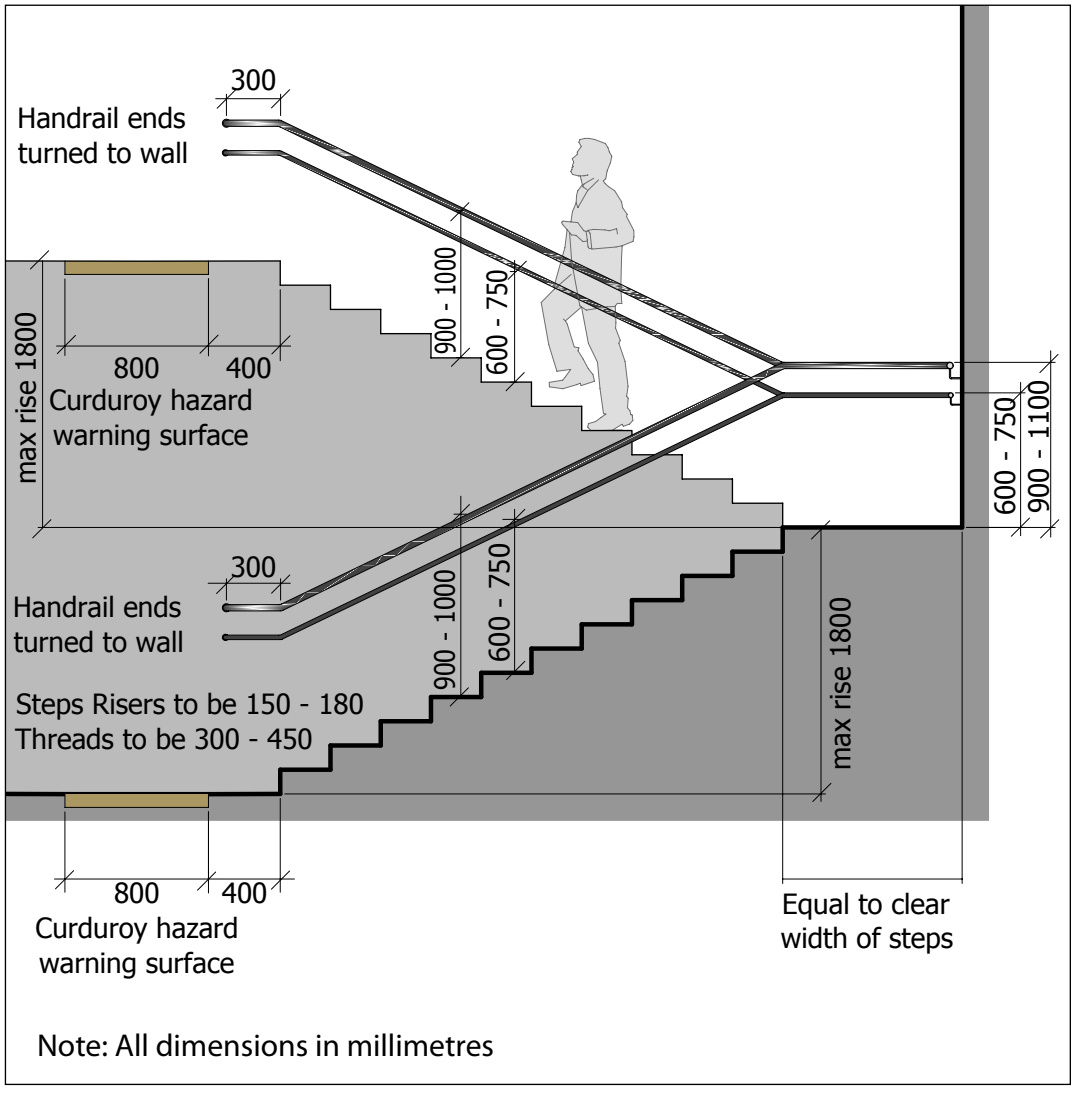
Each step edge should have a non-slip applied nosing or contrasting strip to visually highlight the step edge. The nosing or strip should extend the full width of the step and be 50mm to 70mm deep, measured from the leading edge of the step.

Where nosings comprise a metal frame with a coloured plastic insert, the insert should be a single colour. Nosings comprising two parallel strips of different colours should not be used as these can give a false impression of the location of the step edge.

The clear width of internal stairs should be determined by the expected level of use, but should not be less than 1200mm. The clear width should be measured between handrails.

The total rise of a flight of steps between landings should be no more than 1800mm, and should not contain more than 12 steps, as **Figure 3.2**. Where stairs contain two or more successive flights, the number of steps in each flight should be the same where possible. Single steps should be avoided as they are less readily apparent than a longer flight and may present a trip hazard.

Figure 3.2 Internal stairs.



Landings should be provided at the top and bottom of each flight of stairs. The landing length should be equivalent to the clear width of the stairs, subject to a minimum of 1200mm, and should be unobstructed by any door swings.

Clear headroom of 2200m minimum should be maintained throughout the full length of the stair flight and any landings.

Steps can present a hazard to people with visual difficulties, particularly when located in the direct line of travel. In new buildings and in buildings undergoing internal reorganisation, the location and configuration of stairs should be carefully considered.

Stairs that are not enclosed should not be positioned directly in line with a corridor or principal circulation route; unenclosed stairs should always require a conscious change in direction to use them. This will reduce the likelihood of a person inadvertently stepping onto stairs.

3.5.2 Refuges

Many people are unable to use stairs unassisted, such as young children, older people, or people with mobility difficulties. It is necessary to ensure that they can stay in a safe location until help arrives in case of evacuation.

A common way to facilitate this need is through the provision of safe refuge areas within protected stair enclosures. This is not always possible and may not always be desirable, particularly when dealing with existing buildings where space in the stairs is limited or where large numbers of people who require assistance to escape are anticipated.

The use of refuge areas will often require a person with mobility difficulties to wait alone. Therefore, it is important that designers ensure that appropriate accessible connections for communications devices are installed in the refuge area to prevent individuals becoming fearful or concerned about being left behind in these areas.

It is essential that the use of refuges is discussed fully in advance with those who might need to use them. This should be discussed with employees as part of the drawing up of Personal Emergency Evacuation Plans (PEEPS). Where people are unfamiliar with the use of refuge spaces and their locations in a building, the intervention of staff will be necessary to provide direction and reassurance. It may

also be necessary for staff to remain with those waiting in refuge areas to assist with the use of communication systems or provide general support.

Refuges should be provided so that people with mobility difficulties are not placed at a greater risk from fire than other occupants. This will usually require an assessment of the number of people likely to require the use of a refuge space and assistance with vertical evacuation of the building. Inherent in this assessment is the availability and suitability of appointed staff who can provide assistance.

As a minimum requirement, refuges should:

- have a 1400 x 900mm space clear of the escape route, where a single refuge space is considered sufficient
- be enclosed in a not less than 30 minutes fire-resisting structure that has a 30 minute, fire-resisting, self-closing fire door fitted with cold-smoke seals
- be provided with a 30 minutes fire-resisting construction (integrity and insulation) from a fire inside the building, where the refuge is external
- be located either within, or be a space with direct access to, each protected stairway required for means of escape
- have a two-way communication system linked between the refuge and the management control point, which suits a range of mobility difficulties and is compliant with the recommendations of BS5839-9: 2003
- contain no glazing between the general accommodation and the refuge space
- have clear signage indicating that the space is designated for refuge including identification of the floor level
- have a notice providing guidance on procedures in the event of fire

3.5.3 Tactile hazard warning surfaces for stairs

In some circumstances, the use of a tactile hazard warning surface at the top and bottom of a flight of internal stairs may be appropriate. As with external steps, this can provide a means of highlighting the approaching change in level.

Tactile hazard warning surfaces should provide a visual contrast as well as tactile contrast. However, there are additional potential risks involving the use of such surfaces in internal environments, and these should be fully explored in the form of a risk assessment prior to specification.

Where it is not considered appropriate to use a tactile hazard warning surface, floor finishes that contrast both visually and audibly (when walked on, i.e timber to stone) should be used to highlight the top and bottom of the stair flight.

Tactile hazard warning surfaces are typically manufactured from relatively hard, non-slip materials such as durable GRP (glass reinforced polyester). They have different frictional characteristics from floor finishes commonly found in internal environments such as vinyl flooring, linoleum, and carpet.

Where adjacent materials have different frictional characteristics, they can present a slip or trip hazard and may present an even greater danger to all building users especially those with mobility difficulties. There may also be issues with the use of evacuation chairs (See **Section 8.5 Emergency evacuation in Booklet 8: Building management**) and difficulties arising from using tactile warning surfaces.

Where it is not considered appropriate to use a tactile hazard warning surface, floor finishes that contrast visually should be used to highlight the top and bottom of the stair flight.

Image 3.2 Example of a hazard warning surface. Many others are available. Care should always be taken when choosing a warning surface.

Should tactile hazard warning surfaces be used indoors, 3mm-high ridges may be used as 3mm is detectable on smooth floors.

For details of the recommended dimensions, position and profile of external tactile hazard warning surfacing, refer to **Booklet 1: External environment and approach, Section 1.5.2**.

3.5.4 Handrails for internal stairs

Handrails should be provided to both sides of stairs and be continuous throughout the flight. Where the clear width of a flight of stairs is greater than 2000mm, an additional handrail (or handrails) should be provided to divide the stairs into channels. This will improve safety and will be beneficial to many people, particularly when the stairs are being used by a large number of people at any one time.

No individual channel in a flight of steps should have a clear width less than 1200mm. A central handrail can, however, present an obstacle for people with hearing difficulties who are engaged in conversation. Care should be taken, perhaps using floor colour or textures as a warning, to make them obvious both visually and audibly (when walked on).

Switchback or dog-leg stairs often cause people with hearing difficulties to collide with oncoming people, unless the gap is widened between the switchback runs.

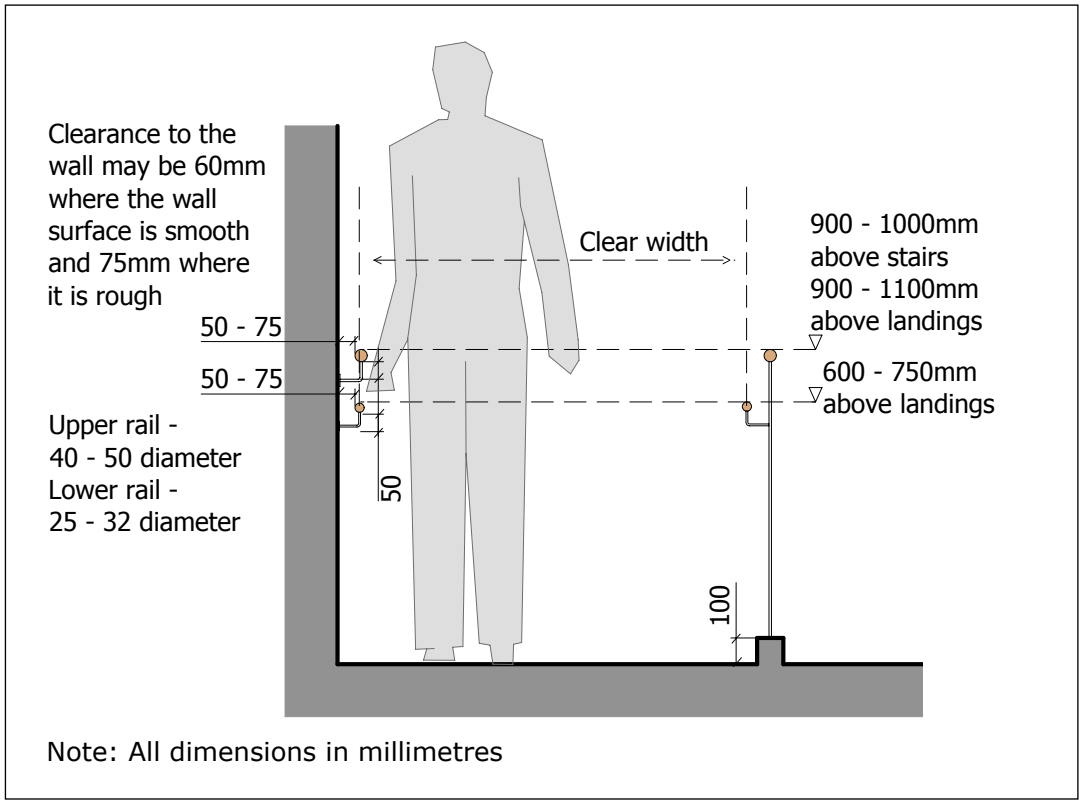
Handrails should be positioned with the upper surface 900mm to 1000mm above the pitch line of the stair flight and 900 to 1100mm above landings.

The provision of a second handrail at a lower height, with the upper surface positioned 600mm to 750mm above the pitch line and landing, is desirable and will benefit people of different heights. Handrails should extend a minimum of 300mm beyond the top and bottom step to provide support to people as they move onto or off the stair flight.

Handrails should be easy to grip and be either circular in cross-section or non-circular with a broad horizontal face, with a diameter of 40mm to 50mm, as **Figure 3.3**. Where a second handrail is provided at a lower height, the diameter may be 25mm to 32mm in recognition that it is likely to be used predominantly by children and that a smaller profile will make it easier to grip. An oval-profiled handrail should be 50mm wide and 38mm deep with rounded edges and a radius of at least 15mm. For both rails, a clearance of 50mm to 75mm between the rail and any support wall or mounting surface should be maintained along the full length of the rail. Where the surface of an adjacent wall is rough, the clearance should be 75mm; where it is smooth, the clearance may be 60mm.

Support brackets should be fixed to handrails centrally on the underside so that a person can run their hands along the full length of the rail without interruption. If the position of the handrail requires a person to release their grip, the person may feel insecure, and may not be able to support themselves adequately. The vertical clearance between the underside of the handrail and any angled support brackets should be 50mm.

Figure 3.3 Handrail details for internal stairs.



The ends of handrails should terminate in a way that signifies that the top or bottom of a flight of stairs has been reached. This can be achieved by turning the handrail towards the wall or downwards for a minimum of 150mm. This arrangement also reduces the likelihood of clothing or bags being caught on the end of the handrails as a person approaches the stair flight.

Handrails should visually contrast with surrounding surfaces so that they are readily apparent to all users.

It is preferred that the area beneath an internal staircase is enclosed in order to avoid the potential for a person to collide with the soffit or any supporting elements.

Where stairs are free-standing, any area where the clear height is less than 2100mm should be protected to prevent access. Means of protection could include a permanent raised flower trough at least 900mm high or a protective guard rail incorporating a low-level tapping rail.

Internal stairs should be illuminated so that they can be used safely at all times. The recommended minimum level of illumination at tread level is 150 lux.

Time-delay or sensor-operated lights used in stairwells should be set to a maximum of 2-3 seconds. However, the time-delay should be set to ensure that the timings accommodate the needs of all users.

Access on existing stairs can often be improved by fitting new or additional handrails; by fitting contrasting, non-slip nosings; and through the provision of additional space on landings by removing cupboards or other redundant features.

Checklist – Internal stairs
• Ensure step dimensions and profile are consistent with **Figures 3.1 and 3.2**.
• Make sure each step edge is visually highlighted.
• Incorporate clear width of steps to suit expected level of use, but not less than 1200mm.
• Check that total rise of flight between landings no more than 1800mm or 12 steps.
• Install consistent number of steps in consecutive flights.
• Avoid single steps on an access route.
• Provide clear landings at top and bottom of steps, with the length equivalent to the step width.
• Use tactile hazard warning surface at top and bottom of flight, only if deemed appropriate following risk assessment.
• Provide handrails on both sides of the steps and continuous around intermediate landings, as **Figure 3.3**.
• Provide an additional central handrail where the stairs are more than 2000mm wide.
• Protect any area below stairs that has headroom less than 2200mm.
• Light step and landing surfaces to 150 lux.
• Ensure that time-delay timings accommodate the needs of all users.

3.6 Internal Ramps

3.6.1 Design and dimensions of internal ramps

Ramps can provide an effective means of overcoming changes in level within a building. Ramps that travel from one storey to another are at present generally only found in large public buildings such as museums, airport terminals, or shopping centres, as the space required is much greater than for stairs or lifts.

Much more common are ramps that accommodate a change in level within a storey of an existing building.

Where any type of ramp is provided, there should always be an alternative flight of stairs. The only exception is with changes in level less than 300mm, where it would otherwise be necessary to have a single step. In many cases there will also be a passenger lift or vertical platform lift, as **Sections 3.7** and **3.9**.

The provision of an internal ramp benefits many people, including anyone pushing a trolley, buggy or stroller; people using a wheelchair; and those conversing in sign language while walking.

Ramps also aid independent and assisted evacuation in many instances, such as when lifts are unavailable. People are generally much less likely to trip on a ramp than on stairs. People also tend to feel more confident assisting another person on a ramp than on stairs.

Internal ramps should have a gradient not exceeding 1 in 20, with a maximum rise of 450mm between landings, and a corresponding maximum ramp length of 9000mm, as **Figure 3.4**.

Where there are two or more consecutive slopes in a ramp, they should be of the same gradient. The gradient of ramps between landings should be constant.

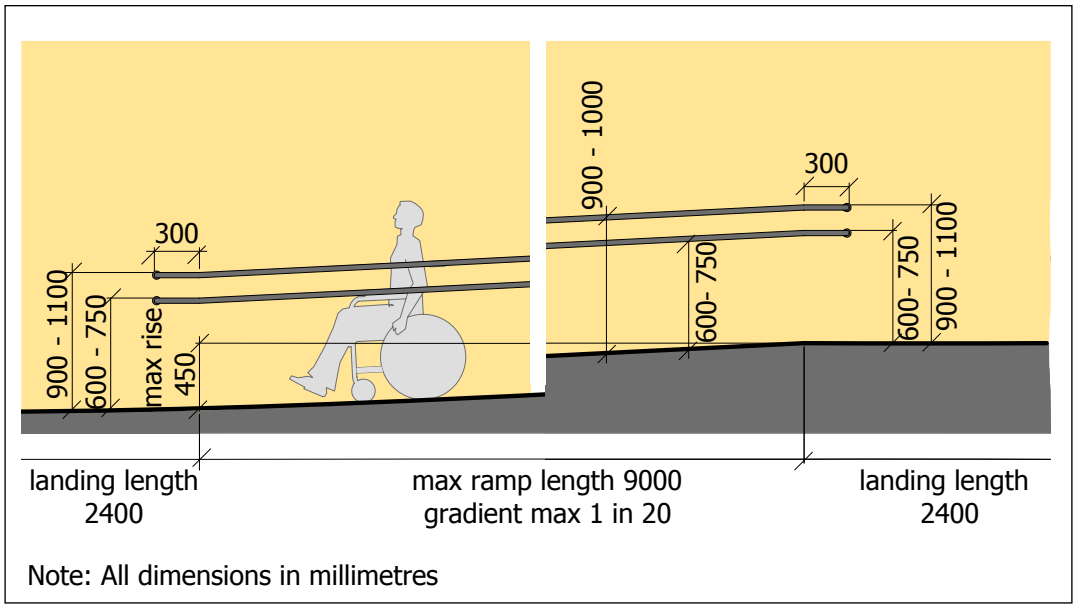
Ramps with steeper gradients should be avoided as they can be difficult for some users to ascend, such as older people; parents with strollers or buggies; and in particular, wheelchair users, due to the strength required to propel a manual

wheelchair up the slope. Descent may be hazardous due to the strength required to slow down and stop the wheelchair.

Steeper gradients also present a risk, in that a wheelchair user may fall forwards out of their wheelchair when descending, or the wheelchair may tip backwards when ascending. Consideration should also be given to parents with strollers and those using walking or mobility aids.

The clear width of a ramp should be determined by the expected level of use and whether people are likely to be using the ramp in both directions simultaneously. In any case, the clear width should not be less than 1500mm. Where a large number of people are expected to use the ramp at any one time, and in both directions, a clear width of 1800mm or more may be appropriate.

Figure 3.4 Internal ramp.



3.6.2 Ramp landings

Landings should be provided at the top and bottom of a ramp and should be 2440mm x 2440mm to provide turning space for wheelchair users; parents with strollers; guide dog users; and people using walking or mobility aids. It is recommended that intermediate landings should be 2000mm long and equal to the width of the ramp. If the ramp is long, or is likely to be used frequently by wheelchair users and people with strollers, the intermediate landing should be increased in width to 1800mm to provide a suitable passing place.

3.6.3 Ramp handrails and kerbed upstands

Handrails should be provided to both sides of the ramp and should be continuous to the full length of the ramp slope, as well as around intermediate landings. Guidance for the height, length and profile of handrails is the same as for internal stairs in **Section 3.5.4** above.

Figure 3.5 Handrail detail for internal ramps.

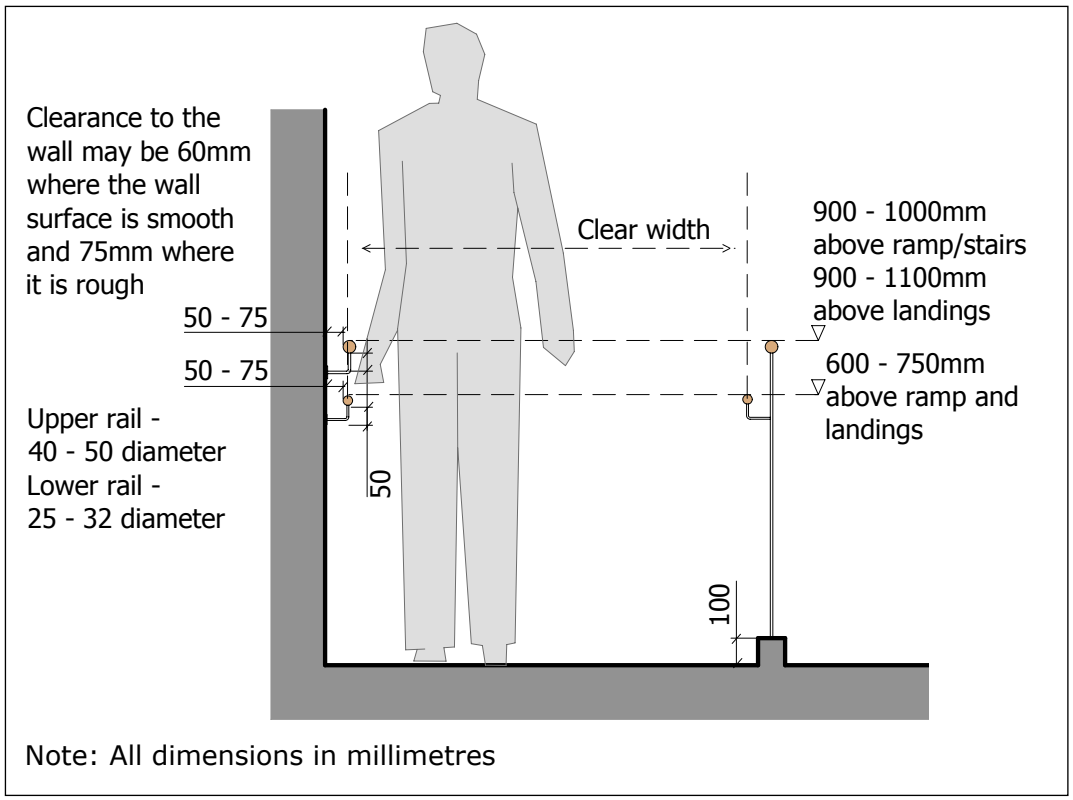
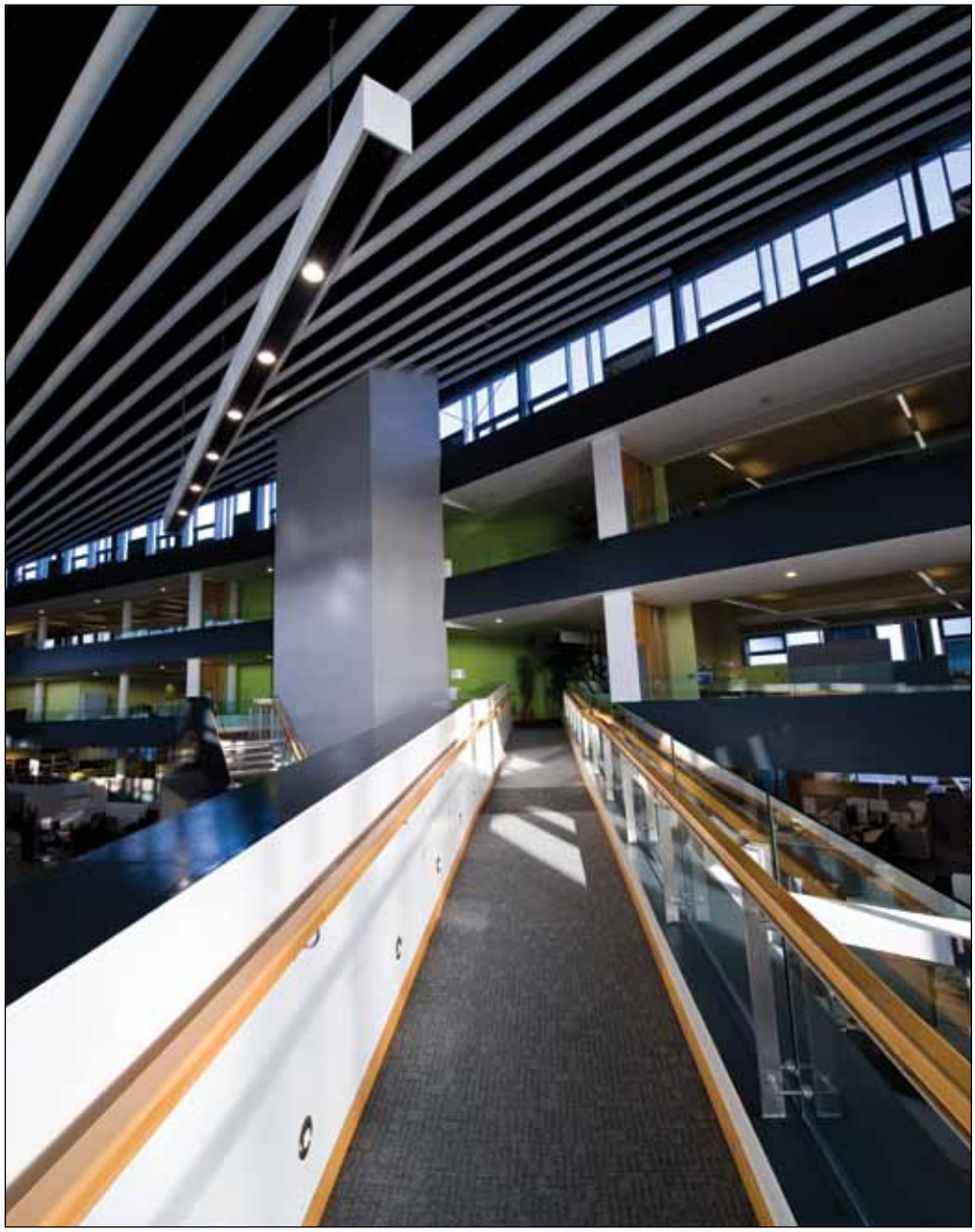


Image 3.3 Example of ramp with selected stone floor surface and contrasting wooden handrails.

The surface of the ramp should be non-slip. The ramp slope should contrast visually with landing surfaces to highlight the change in plane to people with visual difficulties. Tactile hazard warning surfacing should not be used on ramps as it is not designed for this purpose. Its use in these situations would be confusing and potentially hazardous for some people.

Ramps should incorporate a kerbed upstand or other form of edge protection. A kerbed upstand should be 100mm high (above the ramp and landing surface) and should contrast visually with the ramp surface. If a balustrade or guarding is provided to the side of a ramp, this will provide appropriate edge protection, as long as the gap between the ramp surface and lower edge of the balustrade or guarding is no more than 50mm.

Image 3.4 Example of a ramp with carpeted floor finish.



Ramps should be illuminated so that they can be used safely at all times. The recommended illuminance at the ramp surface is 150 lux.

Image 3.5 Alternative example of a ramp with carpeted floor finish.

Signage using the universal sign for a ramp should be provided to notify people that a ramp is available in the building. Please also refer to **Booklet 4 – Internal environment and services, Section 4.11**.

Checklist – Internal ramps
• Ensure maximum gradient of a ramp is 1 in 20, maximum rise 450mm, and maximum length 9000mm, as **Figure 3.4.**
• Make sure the gradient of a ramp slope is constant and consistent throughout and between consecutive ramp slopes.
• Install ramp with clear width to suit expected level of use, but not less than 1300mm.
• Incorporate top and bottom landings of 2440mm x 2440mm and intermediate landings 2000mm long x ramp width.
• Provide handrails on both sides of the ramp and continuous around intermediate landings, as **Figure 3.3.**
• Provide a kerb upstand or guarding to the side of ramp.
• Light ramp and landing surfaces to 150 lux.

3.7 Passenger Lifts

3.7.1 Location of passenger lifts

A passenger lift is generally the most convenient method of travelling between storeys in a building for people who cannot, or prefer not to, use the stairs. In multi-storey buildings, particularly high-rise developments, they are an essential means of access between floors for all building users. In new buildings, installing a lift capable of use in an evacuation should be considered

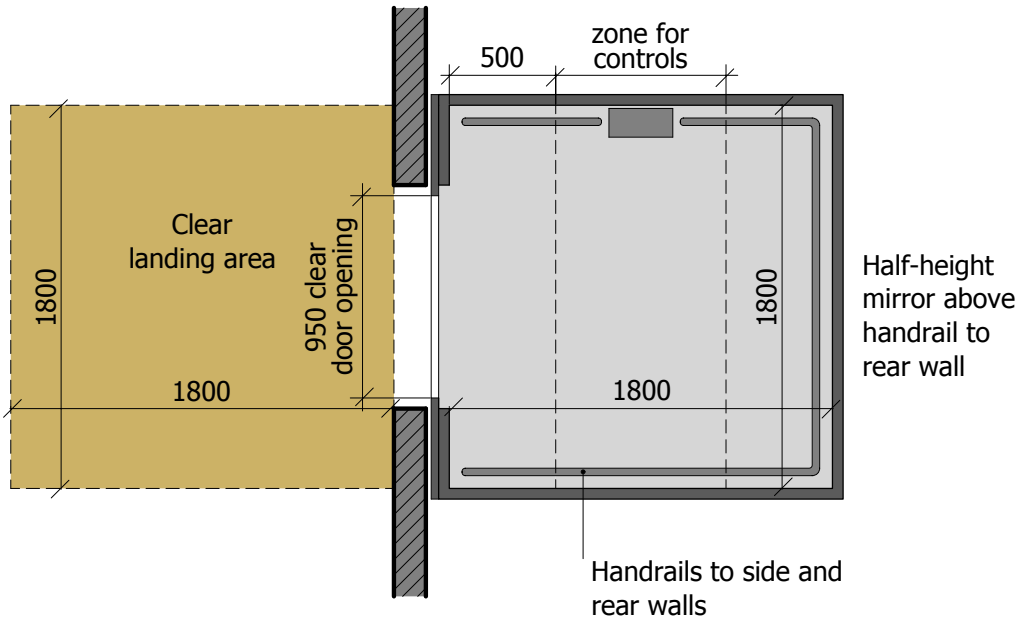
Wherever possible, passenger lifts should be installed in preference to platform lifts, especially in new buildings. Passenger lifts should be universally designed, they should be able to carry more people at any one time, and are much quicker than platform lifts. Passenger lift controls are generally easier to operate and facilitate independent access for all. Passengers lifts can be designed to 'evacuation lift' standard. This means the lift can be used to evacuate the building in case of fire or other emergency.

Where lifts are not designed to evacuation lift standard, designers should ensure that alternative mechanisms are available for the vertical movement of people with disabilities, particularly people with mobility difficulties and wheelchair users, in emergency situations.

Notwithstanding this, there will be circumstances when the installation of a passenger lift is not possible due to structural or other constraints. This may be the case when improvements are being made to some smaller, existing buildings. In these situations, the installation of a platform lift may be appropriate, subject to the recommendations in **Section 3.9** below.

Passenger lifts should always be located adjacent to stairs in order to offer an alternative means of access. This is to meet the needs of people who may be anxious about using a lift and prefer to use stairs in order to access other floors. The stairs should be designed to be accessible, useable and understandable (see **Section 3.5**), as a significant number of people with mobility difficulties, and those with reduced stamina or balance, will still choose to climb a stairs rather than enter a lift.

Figure 3.6 Passenger lift.



Note: All dimensions in millimetres

3.7.2 Glass-walled lifts

Glass-walled lifts can be a source of extreme anxiety for people with vertigo, who might not use them under any circumstances. On the other hand, glass-walled lifts may be preferred by people with hearing difficulties, as they can sense space beyond the elevator car, particularly in the case of a malfunction.

A conventional enclosed passenger lift should always be provided as an alternative to a glass-walled lift. The location of the enclosed lift should be clearly signed and it should not be located at too great a distance from the glass-walled lift.

Lifts should be clearly signed from the entrance (or entrances) of a building and from other key areas within the building at each floor level. The signs should incorporate the International Symbol for Access. (See **Image 3.6**).

3.7.3 Size and capacity of passenger lifts

The size and capacity of a lift (or lifts) will be determined by a number of factors including the building type and occupancy. Lifts in buildings such as railway stations, airports and hotels should be large enough to accommodate people

travelling with luggage. Lifts in hospitals will be required to accommodate beds, trolleys, and other equipment. Lifts in public buildings should be large enough to accommodate a small group of people, including people pushing prams and pushchairs, and people who use mobility aids such as wheelchairs and electrically powered scooters.

Image 3.6 International Symbol of Access.

Where more than one lift is provided in a building, they should all be accessible to, and useable by, all building users.

Wherever possible, a lift should have recommended internal dimensions of 1800mm x 1800mm. This will enable wheelchair users and parents with strollers to turn inside the lift and also provides manoeuvring space for people using mobility scooters.

Lifts with internal car dimensions 2030mm wide x 1525mm deep may be acceptable where space is more limited. In lifts with these dimensions, some people who use wheelchairs or electric scooters and parents with strollers may have to do a three-point turn inside the lift car in order to enter and exit without having to reverse.

An absolute minimum lift car size of 1100mm wide x 1400mm deep may be acceptable in very small premises where the installation of a larger lift is not feasible. However, it is not ideal as the limited size means that wheelchair users and parents with strollers have to reverse out of the lift. Space is also very limited if anyone in the lift is carrying a lot of luggage or pushing a trolley, pram, or pushchair. Lifts of this size may also be too small to accommodate

some electrically powered wheelchairs and scooters, which have a length (when occupied) of 1500 to 1600mm.

3.7.4 Safety devices in passenger lifts

When designing passenger lifts, consideration should also be given to EN 81-70:2003 (IS EN 81-70:2003) 'Safety rules for the construction and installation of lifts. Particular applications for passenger and goods passenger lifts. Accessibility to lifts for persons including persons with disability.'

Lifts should incorporate a self-levelling device that brings the lift car to a stop no more than 10mm from the finished floor level of each landing. A levelling accuracy of 20mm should be maintained during loading and unloading.

Lift doors should provide a clear opening width of 950mm. They should remain fully open for at least eight seconds to provide sufficient time for people to enter and exit the lift car. Doors should stay open longer in lifts where a significant proportion of the people using them are older or have disabilities.

A 'rapid-close' button and a 'hold-open' button should be provided inside the lift car. A 'hold-open' button should be provided on landings, allowing the user to hold the door open for 30 seconds. Doors requiring manual operation should never be used for passenger lifts. Lift doors should contrast visually with the adjacent wall surfaces.

Some lifts are designed with doors on opposite sides, requiring one-way travel into and out of the lift car. These can be advantageous in that they remove the need for people to turn through 180 degrees inside the lift. This is particularly beneficial for smaller lifts such as those with a lift car 1400mm long x 1100mm wide. Lifts with doors on opposite sides are recommended where the lift only serves two floor levels. However, if the lift serves several floors and the direction of door opening is not consistent, the arrangement can be disorientating.

The lift and door-opening arrangement should be as clear and logical as possible so that it is readily understood by everyone using it. The use of clear maps and signage inside the lift and on lift landings will help people to orientate themselves at different floor levels.

A safety device that prevents the lift door from closing on a person or object should be provided. The device should not require any physical pressure or contact to be made with the door, as this can be dangerous and frightening for many people. It should incorporate a 'light curtain,' covering the range 25mm to 1800mm above floor level, and should cause the door to stay open or reopen automatically.

On lift landings, there should be a clear space of 1800mm x 1800mm in front of the lift door to enable people to manoeuvre easily, to approach and reach the lift landing controls, and to enter or exit the lift car. The clear space should be highlighted with a visually contrasting floor finish.

3.7.5 Signage for passenger lifts

Signage bearing floor numbers should be positioned on the lift landing so that it is readily apparent. Two sets of signs will be required: one positioned adjacent to the lift landing controls and another positioned directly opposite the lift doors. The latter should be clearly visible from inside the lift car so that people can check which floor level they have reached before leaving the lift car.

The numbers positioned adjacent to the lift landing controls should not only be visual, but should also be tactile so that they can be read by touch. A combination of large embossed characters and Braille text is ideal. If it is not possible to use both, only embossed characters should be provided. All numbers should visually contrast with the adjacent wall surface.

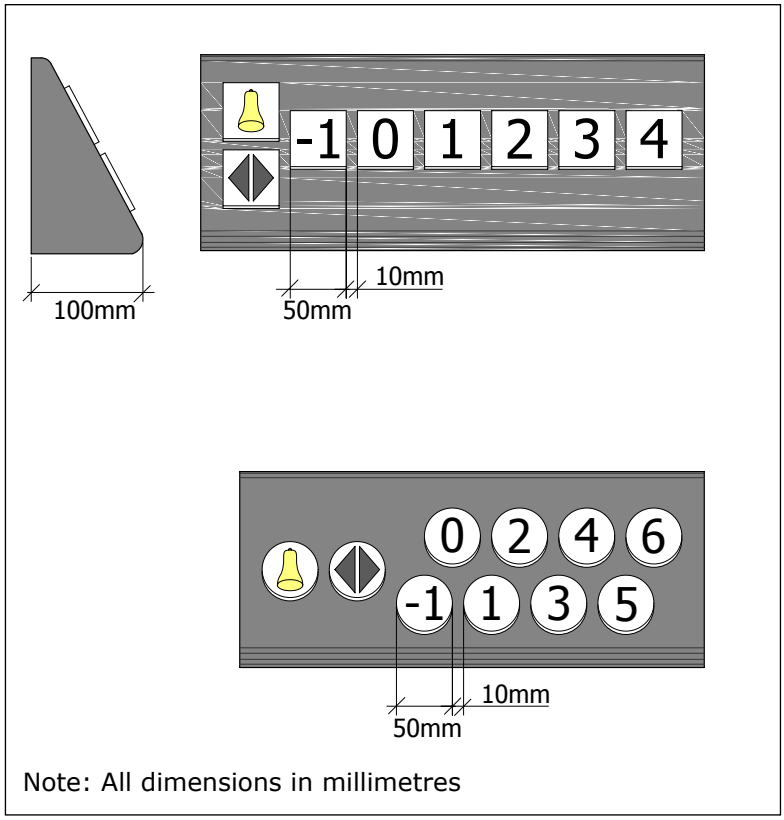
Image 3.7 Example of floor number signage fixed to elevator door frame.

The lift controls should be positioned at a 500mm horizontal distance from any adjacent wall or projecting surface and 900mm to 1100mm from floor level to the centreline of the button. A clear floor space of 1800mm x 1800mm (minimum 1500mm x 1500mm) should be provided in front of any controls. (The only exception to this would be where the lift car itself is less than the recommended dimensions.)

All control buttons should contrast visually with any mounting plate and the mounting plate should contrast visually with the adjacent wall surface so that it is easy to identify. Control buttons should be at least 50mm in diameter or 50mm x 50mm square, with embossed numbers and symbols to enable tactile reading.

Embossed numbers and symbols should be raised a minimum of 1.5mm above the button face or mounting plate and be 30mm to 40mm high. The distance between adjacent buttons should be 10mm. Lift car controls should be mounted on an angled plate that projects 100mm, and positioned in the order illustrated in **Figure 3.7**.

Figure 3.7 Lift car controls.



On each landing, the lift signalling system should provide both visual and audible confirmation that the lift is answering a call, that the lift has arrived, that the lift has stopped, and wherever possible, the next direction of travel. The call button should illuminate when pressed and should also emit an audible signal each time the button is pressed, even if the call has already been registered.

The audible signal should be between 35 dB(A) and 65 dB(A) and adjusted to suit the site conditions on each landing.

Visual indicators showing the current position of the lift and direction of travel should be positioned 1800mm to 2500mm above floor level and should incorporate arrows or numbers at least 40mm high.

Audible signals such as a bell chime should indicate the direction of travel: one chime for up and two chimes for down.

Inside the lift, the signalling system should provide visual and audible indication of the requested floors, the direction of travel, and whether the doors are opening or closing. A visual indicator showing the current floor position should

be positioned above the control panel at a height between 1600mm and 1800m above floor level. Alternatively, two indicators may be provided, one above the doors and another at a lower level within the control panel. The audible signal should be a voice announcement, adjustable between 35 dB(A) and 65 dB(A) to suit the site conditions.

3.7.6 Emergency systems for passenger lifts

An emergency alarm and two-way communication system, linked to a monitored location, should be provided inside the lift car. The alarm system should incorporate both visible and audible signals and have instructions in both tactile and visual form.

The alarm call button should be yellow with a bell-shaped pictogram. The button should illuminate when pressed and provide an additional audible signal to indicate that the alarm has been raised.

The communication system should incorporate either a telephone handset or permanent speaker panel and microphone set into the wall of the lift car. Whichever system is used, it should be suitable for people with hearing difficulties and incorporate an inductive coupler. Telephone handsets should also incorporate volume control. Consideration should also be given to the provision of a text facility in the lift as part of the emergency communication system, this would benefit people with hearing difficulties.

Telephone handsets should be located within a cabinet and positioned with the handset base 900mm to 1200mm above floor level and a minimum of 500mm from the corner. The handset should have a cord length of at least 900mm, to enable the telephone to be used easily by people at a range of heights. The cabinet should be clearly marked with the internationally recognised telephone symbol, which should be at least 100mm high. The cabinet door should be positioned so that it does not obstruct access to the telephone when open. The door should have a handle such as a lever handle that is easy for everyone to use. Sharp edges should be avoided.

Image 3.8 Example of international telephone symbol.

Once lifted from the cradle, the telephone should indicate automatically which lift, if there is more than one, is the source of the call, and then allow two-way conversation. Telephones that require dialling should be avoided wherever possible. Some emergency telephones will signal an alarm when the door of the cabinet is opened. If this is the case, provide a notice to that effect.

3.7.7 Interior finishes in passenger lifts

The floor surface inside the lift car should have a matt finish, be firm and slip-resistant, and have similar frictional characteristics to the floor surface on each landing. It is recommended that the floor surface inside the lift is not dark in colour or tone. This is to reassure people with visual difficulties that they are not stepping into an open lift shaft.

The walls inside the lift car should contrast visually with the floor and ceiling surfaces. This will help people with visual difficulties to assess the size and shape of the lift interior. The walls should have a matt finish in order to minimise the potential for glare and reflections, which may be confusing and cause discomfort for some people.

Image 3.9 Example of lift with contrasting floor and walls. Also note the mirror and grabrail on the wall opposite the door.

Notwithstanding this, a mirror should be provided to the rear wall of all single-door lifts to allow someone to see what is behind them if they need to reverse out. The mirror should extend from 900mm above floor level to ceiling level and be constructed of safety glass. Full-height mirrors should be avoided as they can make the lift car resemble a corridor which may cause people to walk straight into the rear wall.

Any areas of glass in lifts, such as the doors, lift car walls or shaft walls in glass-walled lifts, should incorporate permanent markings so that the glass is clearly apparent to people from a range of eye levels. The markings should be at two levels, 850mm to 1000mm and 1400mm to 1600mm above floor level. The markings should contrast visually with the background surfaces viewed through the glass in all lighting conditions.

Lights in lifts should be carefully positioned to provide an even distribution of light and to avoid the potential for glare and shadows. Lights positioned behind or to the side of the control panel should be avoided as they are in the direct line

of vision and cause the control panel to be silhouetted. This makes it very difficult for anybody using the controls and may even be physically painful for some people's eyes.

The use of indirect lighting such as uplighters or ceiling panels that diffuse light evenly throughout the lift car are preferred. The lights should provide an even level of illumination at the floor surface of 100 lux.

Image 3.10 Example of lighting in a lift.

Handrails should be provided to all internal walls of the lift car, apart from the wall (or walls) incorporating the lift doors. Where handrails meet the lift controls, the handrails may stop either side of the controls. They offer support to people who may be unsteady on their feet and to people who may otherwise be anxious about travelling in a lift.

Handrails should be positioned 900mm above floor level, be 30 to 45mm in cross-section with a 10mm minimum radius and be mounted with a clearance of 35 to 45mm from the lift wall.

The provision of a tip-up seat may be appropriate in certain lifts as they can be of benefit to some people who are unsteady on their feet or have poor stamina. Where provided, tip-up seats should be 500mm above the floor, and have a depth of 300mm to 400mm and width of 400mm to 500mm. Tip-up seats should be capable of supporting a load of up to 100kg.

3.8 Evacuation Lifts

Some lifts are designed to be safe to use for evacuation in case of fire or other emergency. These lifts are particularly useful for ensuring safe, independent, and dignified evacuation of wheelchair users; people with other mobility difficulties; and those who may have stamina or balance difficulties such as children, older people and pregnant women.

Evacuation lifts are required to be enclosed in a fire-resisting shaft and have an independent electrical supply. The fire-resisting enclosure should extend around the landing or a protected lobby at each floor level served by the lift and to the final exit doors at exit level.

Evacuation lifts also require additional controls that enable them to be operated only by an authorised person. This includes the provision of a clearly marked switch at the exit storey level, which, when operated, causes the lift to return to the exit level. The lift can then be operated by the designated person in accordance with the evacuation procedure and is isolated from the landing controls.

It should be noted that it is the Office of Public Works (OPW) policy to incorporate evacuation lifts in all future new buildings. It is also important to state that if an evacuation lift is provided, refuge spaces are still required.

Lifts intended for use in evacuation should be designed to meet Irish Standard EN 81-70:2003 'Accessibility to lifts for persons including persons with disability.'

Where evacuation lifts are not provided, designers should ensure that alternative mechanisms are available for the vertical movement of people with disabilities.

Further guidance on emergency evacuation is included in **Booklet 8: Building management** and in the NDA publication 'Promoting Safe Egress and Evacuation for People with Disabilities.'

Checklist – Passenger lifts and evacuation lifts
• Provide passenger lifts in preference to platform lifts, wherever possible.
• Locate passenger lift adjacent to an accessible flight of stairs.
• Provide conventional enclosed lift as an alternative to glass-walled lifts.
• Ensure lifts are clearly signed from building entrance and other key areas.
• Install lifts with the size and capacity to suit building type and occupancy.
• Ensure that all lifts are accessible , where more than one lift is provided..
• Keep to recommended minimum internal dimensions of 1800mm x 1800mm, as **Figure 3.6**.
• Incorporate clear door opening width of 950mm.
• Ensure lift doors remain open for a minimum of eight seconds.
• Design a lift door arrangement that is consistent and logical.
• Incorporate 'light curtain' safety device, extending 25mm to 1800mm above floor level.
• Include clear landing space of 1800mm x 1800mm.
• Provide visual and tactile floor numbers at each landing.
• Position landing and lift car controls within reach of all users.
• Install control buttons that are easy to use, as **Figure 3.7**.
• Ensure the lift signalling system is both visual and audible.
• Provide an emergency communication system that is suitable for all users.
• Design lift interior to minimise glare and reflection.
• Use even level of illumination of 100 lux.
• Provide half-height mirror to rear wall.
• Install handrails on all walls without doors.
• Consider the provision of a tip-up seat.
• Locate evacuation lifts in fire-resisting enclosure with independent electrical supply and additional controls.

3.9 Vertical Platform Lifts

Vertical platform lifts, which are also termed powered lifting platforms, should not be installed in new buildings, but may be considered as a means of improving access in existing buildings when the installation of a passenger lift is not possible. A vertical platform lift may provide an alternative means of access between split floor levels; to a mezzanine; or between two or more floors in an existing building where structural or other constraints preclude the use of a passenger lift.

Vertical platform lifts should facilitate independent, useable and understandable access; people should not have to seek assistance or permission in order to use it.

The advantages of vertical platform lifts are that they typically take up less space in a building compared to passenger lifts, due to the absence of a structural shaft and motor room, and the requirement for only a shallow lift pit.

3.9.1 Retro-fitted vertical platform lifts

Vertical platform lifts are generally much easier to retro-fit into existing buildings as they can be free-standing and are likely to require substantially less in the way of structural alterations than a conventional passenger lift. In this respect they may be more suited to use in historic environments where their use avoids the need to make significant irreversible alterations to the building structure.

3.9.2 Location and use of vertical platform lifts

As vertical platform lifts are not generally designed to be safe for use in evacuations, designers should ensure that alternative mechanisms are available for vertical movement of people with disabilities in emergency situations.

Image 3.11 Example of a vertical platform lift.

Vertical platform lifts can be installed externally and may be used to access basement areas or the raised ground-floor level of an existing building. They should never be used at entrances to new buildings in place of a ramp.

A number of additional issues should be fully explored when considering the use of an external vertical platform lift, such as, whether access should be monitored to prevent misuse; any additional maintenance requirements due to the lift being exposed to the weather; and the risk of vandalism.

Vertical platform lifts are much slower-moving than conventional passenger lifts, having a maximum speed of travel of 0.15m per second compared with 0.25m per second to 1.0m per second for passenger lifts in low-rise buildings, and 4.0m per second in high-rise buildings. This means that they are much less suited to carrying significant numbers of people within a short timeframe.

Vertical platform lifts are designed to carry a maximum of two people (one wheelchair user and one companion) at any one time, whereas passenger lifts typically have a capacity for eight or more people. When considering the

installation of a vertical platform lift for any application, all these factors should be fully considered.

Wherever vertical platform lifts are provided, there should always be an associated flight of stairs or steps in order to offer an alternative means of access. Any landing area should be ancillary to the main circulation route.

3.9.3 Recommended dimensions for vertical platform lifts

Vertical platform lifts should have a platform size of at least 1100mm x 1400mm. However, it should be noted that platforms of this size may be too small to accommodate some electrically-powered wheelchairs and scooters that have a length, when occupied, of 1500mm to 1600mm. A larger platform should be provided wherever possible in order to be accessible to all.

Image 3.12 Example of a vertical platform lift with an associated flight of steps**.**

Vertical platform lifts are designed to have doors, gates or barriers on more than one side. This is an essential feature where it serves floor levels that are less than a storey height apart. Such 'short-rise' lifts typically have gates or barriers

on opposite sides enabling through-travel. This is the preferred arrangement as it avoids the need for a person to turn through 90 degrees as they enter or leave the platform. However, where through-travel is not possible, it may be acceptable to position the entry and exit points on adjacent sides of the platform. Vertical platform lifts with doors on three sides are also possible and may suit locations with multiple changes in level.

Image 3.13 Example of vertical platform lift showing interior and controls of lift.

3.9.4 Short-rise vertical platform lifts

Short-rise vertical platform lifts that travel up to 2000mm vertical distance, do not have to be fully enclosed unless their location requires them to be protected from an adjacent area by fire-resisting construction.

3.9.5 Enclosed and non-enclosed vertical platform lifts

Vertical platform lifts that travel more than 2000mm are required to be fully enclosed, whether or not the enclosure is required to be fire-resisting. The

enclosures are not required to be load bearing in the same way as they are for conventional passenger lifts.

Non-enclosed vertical platform lifts should have a safety guard and gate or barrier on both the entry and exit side of the platform to safeguard people while travelling on the lift. The safety guard and gate or barrier should remain in place while the platform is in motion. Gates and barriers should be at least 800mm high and incorporate a horizontal rail 300mm above platform level. The clear opening width of any gate or barrier should be 900mm. Any non-access side of the platform should have a permanent, solid barrier at least 1100mm high.

Enclosed vertical platform lifts should incorporate doors at each point of access. Doors should provide a clear opening width of 900mm and be outward-opening. The design and positioning of a door, and the selection of door ironmongery and power-assisted opening devices should be in accordance with the guidelines in **Booklet 2: Entrances and horizontal circulation**.

Manually-activated powered doors incorporating a wall- or post-mounted push pad or button are preferred to manually-operated doors. Wall- or post-mounted controls should be positioned 750mm to 1000mm above floor level and no closer than 1400mm to the swing of the door or clear of a sliding door in the open position.

It should not be necessary for a person to have to manoeuvre backwards or clear of the door swing after activation of the door control device. Wall- or post-mounted controls should contrast visually with the surrounding surfaces and incorporate the International Symbol for Access.

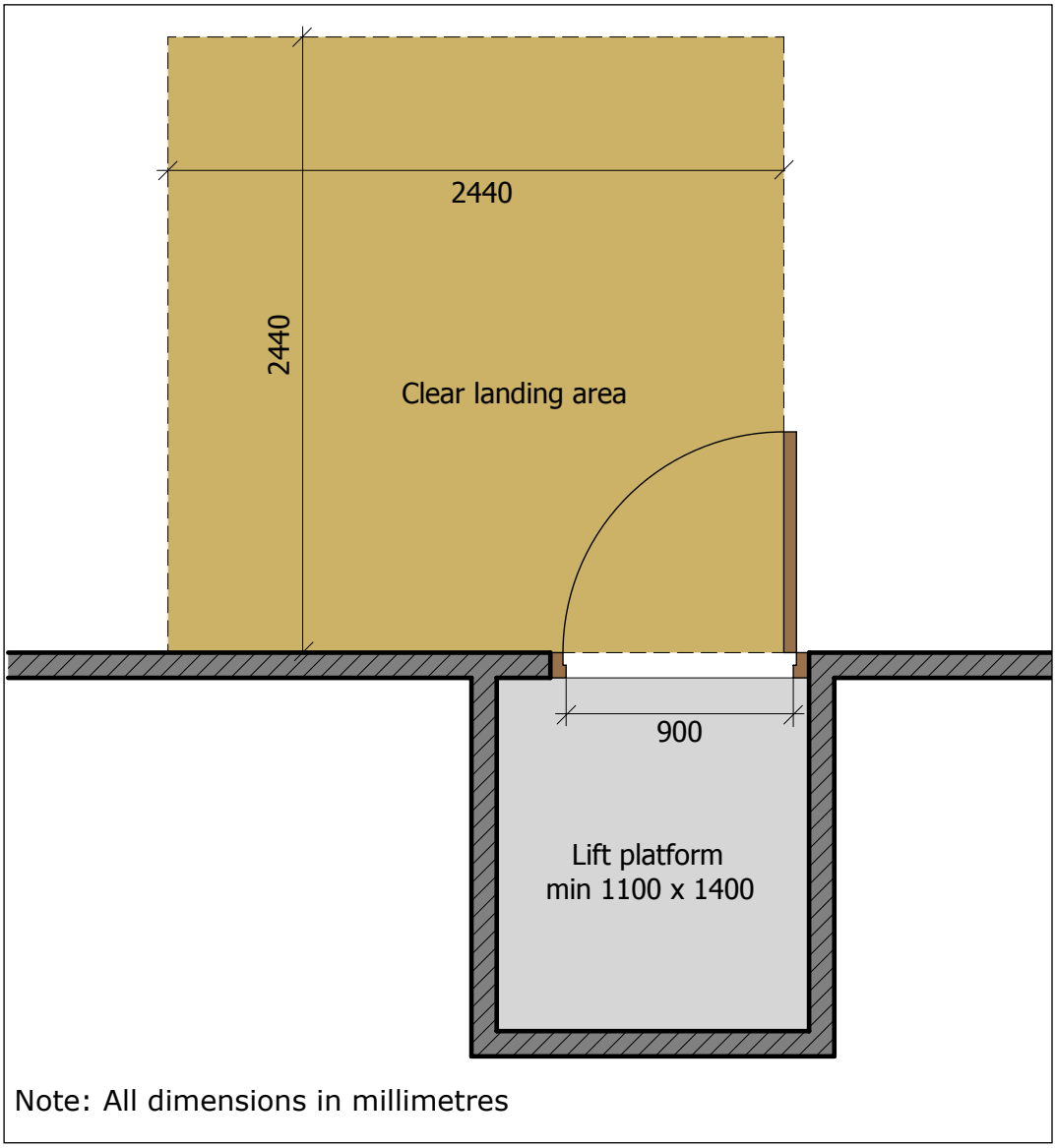
The clear space on each landing should be 2440mm x 2440mm to enable people to approach and manoeuvre around the door or gate and to turn through 180 degrees, as **Figure 3.8.**

3.9.6 Controls for vertical platform lifts

Controls for vertical platform lifts should follow the guidelines for passenger lifts, as **Section 3.7.4** above. The controls that cause the platform to move up or down require continuous pressure to be exerted. If the person using the lift releases

pressure on the controls, the platform stops, whether or not it has reached its final destination. This is a safety function and is far from ideal, particularly for people who find it difficult to maintain pressure on the controls for any length of time. Assistance should be provided to people using the lift who may find using the controls difficult. The use of a control device mounted on a cord that can be placed on a user's lap, or operated by either hand, is likely to benefit some people. Building users should also be able to quickly and easily identify a source of assistance, should this be required.

Figure 3.8 Platform lift.



Note: All dimensions in millimetres

At each landing, the platform lift signalling system should provide both visual and audible indication that the platform has arrived. Inside the platform lift enclosure, or on the platform control panel, the signalling system should provide visual and audible indication of the floor level reached.

An emergency assistance button should be incorporated into the platform lift control panel and it should be linked to a trained source of assistance.

Guidance on lighting, the selection of floor and wall surfaces, and the provision of handrails and tip-up seats for vertical platform lifts should follow the guidance for passenger lifts in **Section 3.7.7** above.

Checklist – Vertical platform lifts
• Provide vertical platform lifts in existing buildings only, in situations when passenger lifts cannot be installed.
• Consider the vertical platform lift size, capacity, speed and frequency of use fully.
• Install a recommended platform size of 1100mm x 1400mm.
• Incorporate a gate, barrier and door clear opening width of 900mm, and ensure all open outwards.
• Provide permanent solid barrier to non-access sides of platform.
• Design the doors in accordance with guidelines in Booklet 2, Entrances and horizontal circulation.
• Locate manually-activated door controls in a suitable location.
• Include a clear landing space of 2440mm x 2440mm, as **Figure 3.8**.
• Provide visual and tactile floor numbers at each landing.
• Position landing and lift car controls within reach of all users.
• Install control buttons that are easy to use, as **Figure 3.7**.
• Ensure the signalling system is both visual and audible.
• Provide an emergency communication button that is suitable for all users.
• Design the platform lift enclosure interior to minimise glare and reflection.
• Employ even level of illumination of 100 lux.
• Install handrails on non-access sides of platform.
• Consider the provision of a tip-up seat.

3.10 Inclined Platform Stairlifts

Inclined platform stairlifts travel along the slope of a stair. They incorporate a fold-down platform for wheelchair users and may also have a tip-up seat to facilitate use by older people, and those with balance or stamina difficulties. In general they should be avoided in new buildings. They may be acceptable in some non-domestic situations such as in a small existing building where it is not possible to install a passenger lift or vertical platform lift.

Inclined platform stairlifts should not be used where any part of the platform or support rails encroach into the recommended clear width of the stair, or where the safety of other building users will be compromised.

When the unit is folded, all parts should be recessed out of the circulation route and any exposed edges padded to reduce the likelihood of people bumping into the platform or catching their clothing on sharp edges.

As inclined platform stairlifts are not generally designed to be safe for use in evacuations, designers should ensure that alternative mechanisms are available for the vertical movement of people with disabilities in emergency situations.

Inclined platform stairlifts should only be used in buildings where assistance is available, although they should be available for independent use when required.

Image 3.14 Example of an inclined platform stairlift shown from above.

3.10.1 Recommended dimensions for inclined platform stairlifts

The recommended platform dimensions should be 890mm wide x 1525mm long. Clear instructions on using the stairlift should be provided and controls should be easy to use.

The side of the platform nearest the wall or support rails should be solid up to a height of 1100mm above the platform. This part of the stairlift may be used to mount the controls, a handrail, and tip-up seat, which should conform to the guidelines for vertical platform lifts in **Section 3.9.6** above.

Moveable guards and barriers should be provided to the other three sides, with safety mechanisms that allow only the side nearest the landing to be raised or lowered once the stairlift has reached its destination.

Image 3.15 Example of an inclined platform stairlift viewed from below.

Image 3.16 Example of an inclined platform stairlift.

Checklist – Inclined platform lifts
• Provide inclined platform stairlifts in existing buildings only, in situations when passenger lifts and vertical platform lifts cannot be installed.
• Avoid inclined platform stairlifts where the device encroaches into the recommended clear width of the stair or compromises the safety of other building users.
• Install a recommended platform size of 890mm wide x 1525mm long.
• Provide clear instructions for use.
• Include controls that are easy to use.
• Ensure lift has 1100mm-high solid side nearest to wall or support rails.
• Use moveable barriers and guards with integral safety mechanisms.

3.11 Stairlifts

Stairlifts, including chair stairlifts and perching stairlifts, are not suitable for use in public buildings. These types of stairlift are designed for domestic use only, where they can be tailored to meet an individual's needs and where a person can be fully trained in using the equipment. Occasionally, they may be used in situations such as an employment location where they are provided for use by a particular individual. In such locations, they should not obstruct the recommended clear width of the stairs or any emergency exit route.

Image 3.17 Example of a stairlift.

Checklist – Stairlifts
• Restrict chair stairlifts and perching stairlifts to domestic installations and occasional employment situations to meet an individual's needs.
• Never use where the device encroaches into the recommended clear width of the stair or compromises the safety of other building users.

3.12 Escalators

Escalators make vertical travel between storeys quick and easy for many building users and are a common sight in large buildings, such as, shopping centres, airports, railway stations, and some office atria. However, they do not provide a means of access for all and are unsuitable for people pushing strollers and buggies; some people with disabilities; and people with dogs. (Dogs, including assistance dogs, are not permitted on escalators because of the risk of entrapment.)

Some people feel anxious about using escalators and prefer to use alternatives such as stairs, ramps or lifts. An alternative means of access should therefore always be provided in association with escalators. The location of alternative access routes should either be readily apparent or clearly signed.

Image 3.18 Example of escalator with directional signs.

The direction of movement of escalators should be clearly indicated with a sign at the top and bottom. The footway at both ends of escalators should contrast visually with the escalator, and be highlighted with a change in floor finish.

Image 3.19 Example of an escalator with lighting under handrails.

3.12.1 Recommended dimensions for escalators

The moving handrails to each side should be positioned between 900mm and 1100mm above the pitch line of the escalator and extend at least 300mm beyond the top and bottom step. The handrails should contrast visually with the surrounding surfaces and move at the same rate as the steps.

Escalators should have a minimum width of 580mm and a maximum width of 1100mm. The steps should have a maximum height of 240mm, or 210mm if the escalator will be used as an emergency exit route when stationary.

Escalator step treads should have a matt, non-reflective, and non-slip finish. The leading edge of each step should have a visually-contrasting band, 55mm wide and extending the full width of the step. Clear headroom of 2300mm should be maintained throughout the full length of the escalator.

Where escalators are expected to be heavily used, there should be a clear approach area extending at least 10m. The level moving section at the top of an escalator should be at least 2000mm long, and at the bottom should be at least 1600mm long. An audible warning should be provided at the top and bottom of the escalator to warn people that they are approaching or leaving a moving surface.

3.12.2 Escalator speeds

Escalator speed should not exceed 0.75m per second. This may be lower (0.5m per second) where fewer passengers are expected. The recommended angle of the escalator is 30 to 35 degrees.

Emergency stop controls should be clearly identified and should be within reach of all users.

Image 3.20 Example of escalator showing both up and down directions, pole-mounted emergency stop buttons, plus a standard staircase in between.

Image 3.21 and 3.22 Examples of escalator emergency stop buttons.

Image 3.23 Example of external escalator showing tactile hazard warning strips on both up and down directions.

Checklist – Escalators
• Provide a clearly-signed or readily apparent alternative means of access.
• Ensure the direction of travel is clearly signed.
• Make sure the footway at each end contrasts visually and install a change in floor finish.
• Ensure moving handrails extend 300mm minimum beyond the start and end of escalator.
• Ensure escalator steps are a minimum of 580mm wide and a maximum of 1100mm wide.
• Provide maximum step height of 240mm, or 210mm if escalator used for emergency escape when stationary.
• Incorporate 55mm-wide contrasting band to full width of each step edge.
• Employ vertical clearance of 2300mm.
• Ensure clear approach at least 10m long.
• Include level moving section of escalator of minimum 2000mm at top and 1600mm at bottom.
• Install visually-contrasting handrails.
• Employ escalator speed not exceeding 0.75m per second.
• Ensure emergency stop controls are visible and accessible to all users.

3.13 Travelators

Travelators (or moving walkways) are used where long internal horizontal distances are to be travelled and are common in buildings such as large airports and some railway stations. Where distances are very long, alternative ways (e.g. electric buggy / golf cart) should be considered to transport people with limited or no walking capacity. The design of the spaces involved should leave sufficient room for such vehicles to safely negotiate their way amongst crowds of passengers. However, they can be hazardous for people who are unsteady on their feet or who cannot move quickly onto and off the moving walkway.

The speed and motion of travelators may cause anxiety for some people, who will prefer to use an alternative route. An alternative, useable and understandable access route should therefore always be available alongside a travelator. In most cases, this is likely to comprise a linear path or corridor. However, where the travelator is inclined, the provision of a ramp, steps, and lift may also be necessary.

The direction of movement of travelators should be clearly indicated with a sign at both ends of the walkway. The footway at both ends of travelators should contrast visually with the travelator and be highlighted with a change in floor finish.

The moving handrails to each side should be rounded in profile and extend at least 700mm beyond the start and end of the moving walkway. Handrails should contrast visually with surrounding surfaces. Travelators should be at least 1500mm wide and have a vertical clearance of 2300mm to their full length. A minimum 6000mm-long level static run-off should be provided at the end of each travelator.

The vertical panels to each side should be non-reflective and the walkway surface should be non-slip.

Image 3.24 Example of inclined travelator.

The speed of travelators should be kept to a minimum. The recommended speed is 0.5m per second (maximum 0.75m per second).

Emergency stop controls should be clearly identified and be within reach of all users.

Inclined travelators should have a gradient not exceeding 1 in 20.

Image 3.25 Example of travelator with signage.

Image 3.26 Example of travelator with emergency stop button and guard rails alongside pedestrian corridor.

Fixed guarding should be provided at both ends of a travelator and alongside adjacent access routes, wherever there is a potential for people to inadvertently walk towards the moving surfaces. Guardrails should contrast visually with adjacent surfaces.

Checklist – Travelators
• Provide clearly-signed or readily apparent alternative means of access to travelators.
• Ensure direction of travel is clearly signed.
• Install footway at each end that contrasts visually and a change in floor finish.
• Moving handrails to extend 700mm minimum beyond the start and end of walkway.
• Install visually-contrasting handrails.
• Ensure recommended walkway width of 1500mm wide and vertical clearance of 2300mm.
• Include static level run-off at least 6000mm long at each end.
• Employ recommended speed of 0.5m per second.
• Ensure emergency stop controls are clear, visible, and accessible to all users.
• Restrict inclined travelators to maximum gradient of 1 in 20.
• Use fixed guarding at entry and exit points and alongside adjacent access routes.
• Ensure guarding contrasts visually.

A1 Definition of Universal Design

Universal Design

'Universal Design refers to the design and composition of an environment so that it can be accessed, understood and used to the greatest extent possible by all people, regardless of their age, size, ability or disability.'

Synopsis of the Disability Act, 2005.

A2 Human Abilities and Design

The following piece of text is an extract from European Ref: CEN/CENELEC Guide 6 'Guidelines for standards developers to address the needs of older persons & persons with disabilities'.

It states that: Physical, sensory and mental abilities vary from person to person and for individuals as they get older. Diversity is normal. Designers need to be aware of difference across the range of human abilities, and of associated design considerations.

(a) Physical abilities

This includes walking, balance, handling, pulling, pushing, lifting and reaching. Many activities involve simultaneous use of more than one of these skills. Physical strength and stamina may also affect people's abilities to perform these actions.

Walking

For some people walking on the level or up gradients is difficult. Some people may have a limited walking range, may have difficulty with turning movements or may use mobility devices such as crutches or a walker. They may need to stop frequently, to regain strength or catch breath. Design considerations include provision of handrails, seats at regular intervals, convenient set-down parking and adequate time for slower pedestrians at road crossings. Designers should also consider the needs of people walking and engaging in sign language when designing access to and from buildings plus within the buildings themselves.

Balance

Balance limitations can affect someone's gait or control of hand movements. Design considerations include handrails, regular seating, and providing controls within easy reach. A surface against which a person may stumble against or walk into should be designed to limit abrasion.

Handling

A significant minority of people are left-handed. Some people may have restricted use or no use of one or both hands, or may have limits on strength or precision. Facilities and components should be designed to be suitable for use with either hand or with one hand only. Handling includes gripping, grasping and manipulation. Each of these has a different purpose with specific design considerations. For instance, components should be designed to be easily held. The circumference of the supporting structure and stability are critical. Manipulation involves the moving, turning and twisting of components with a hand or hands. For those who have limited manipulation abilities, size and shape and ease of movement are critical. Another option to consider is to design for manipulation by using a pushing, pulling or pressing action using a clenched fist, or by using the wrist or the elbow.

Strength and endurance

Strength and endurance may be required on sloping paths and floors, stairways and long travel distances, when sustained effort may be needed.

For those with limited endurance, frequent resting-places are essential.

People generally find it easier to push a component, than to pull it. This is particularly so if the individual uses a wheelchair. Self-closing devices on manual doors can be difficult for some people to operate, particularly if the doors are required to resist wind forces. For these reasons, doors that open and close automatically are preferred.

Lifting

Activities such as opening a vertically sliding sash window and an upward opening access gate, should be designed to be easily operated with minimal force.

Reaching

Design has a role to play in ensuring that key components in a building or environment are in easy reach, bearing in mind the range of people's sizes and abilities. Having components within easy reach is particularly important for those with more severe limitations in mobility. The reach range is dependant on the height and arm length of the person, use of the arms, and the balance and mobility of the upper body. A 'comfortable reach range' has been defined as one that is appropriate to an activity that is likely to be frequent and in need of precise execution and that does not involve stretching or bending from the waist. Putting things within comfortable reach can ensure use by a greater number of people. An 'extended reach range' has been defined as one that is appropriate to an activity that is likely, neither to need precision nor to be frequent and that can involve stretching or bending from the waist.

(b) Sensory abilities

Speech

Some conditions affect the capacity for or quality of speech. Two-way communication can be facilitated by environments designed to minimise barriers to hearing low or indistinct speech.

Hearing

People differ in their capacity to hear sound, to determine its direction, its source, to discern pitch, frequency, volume and variation and to separate out different sounds. Hearing quality is important for communication, for information, and for detection of hazards such as traffic. Many people with hearing difficulties

use a hearing aid which amplifies all sounds caught by the microphone, making communications very difficult in noisy environments. Keeping background noise level low is essential. The selection of structural and surface materials can make a substantial difference in audibility. Auditoriums, meeting rooms and reception areas can benefit from additional sound enhancement such as a loop system. The careful design of illumination can assist in communication such as lip reading and sign language. Provision of visual information and visual alarm systems can communicate information to those who have hearing difficulties or who cannot hear. Foregrounding of sign language required. Designers should also consider the colour and size of rooms and even the furnishing arrangement as this is very important for visually based communication. Also the use of vibration as means of sensing others should be considered.

Sight

Vision allows an individual to be aware of the luminance of surfaces, objects, form, size and colour. For people who are blind or who have visual difficulties, the provision of suitable tactile walking surface indicators and tactile or acoustic warnings at hazardous locations, should provide information on using the built environment and should limit the risk of injury. The built environment can be designed for orientation by providing sound cues and tactile cues. An easily discernible system of 'way finding' should also be considered. For people with limited, but low vision, effective visual contrast between surfaces or objects helps to identify critical locations. Warning markings on glass surfaces, and markings on the edges of stair treads, help minimise hazards.

Differences in friction between one floor surface, or one stair tread surface, and the next should be avoided. Therefore, adjacent surfaces that display different standards of slip-resistance, or that depend on raised surfaces, should be carefully considered

Touch

In selecting surfaces in the built environment that people will need to touch (such as handrails, handles, knobs and controls, tactile information), it is important to select materials that avoid distress, injury or allergies. Surfaces should be free of abrasions. Metals that may cause adverse reactions when touched should be avoided.

(c) Mental abilities

Mental abilities include cognition, intellect, interpretation, learning and memory. People differ in their knowledge, their capacity to understand, reason, or interpret information. Designing for differences in these capacities helps provide a usable environment for the population at large, from the very young to the old, and people of diverse abilities. Means of communication in the environment should be designed to be immediately and easily understood, and correctly interpreted. As people age, some experience loss of memory or find it increasingly difficult to absorb new information, so changes in the environment should be carefully considered before implementation.

Design considerations that take account of mental abilities

Aural and visual messages should be simple, clear and have immediate impact. Figures, symbols and simple words are likely to be the most effective. Symbols should be instantly recognisable as representing images seen and activities undertaken in everyday life.

Way finding should be simple, such as tactile, graphic, audible or architectural cues that are easy to follow. Signage should be large and clear. Way-finding maps should be clear, indicate the person's whereabouts in the building or facility, and be free from extraneous information.

(d) Age and size

Accommodating the developing child

It is important to create environments that are safe, accessible and useable for children. Individual components should be safe and useable as age-appropriate. Learning to manage risk is an essential part of a child's development.

Accommodating ageing adults

Life span within the human population is increasing. More and more we expect to maintain an economic and social life within both the public and private domains as we age. However, many human faculties are in decline as we age, such as mobility, dexterity, stamina, strength, hearing, sight, or memory. Familiarity with a particular environment is important.

Diversity of size

The population contains a diversity of sizes and heights, from children, to the diversity in the height of fully-grown adults. The positioning of components and the heights of building elements such as steps should recognise the diversity of height. Increased weight and girth is now also a feature of the population.

Ref: CEN/CENELEC Guide 6 'Guidelines for standards developers to address the needs of older persons & persons with disabilities'.
http://www.cen.eu/cen/Sectors/Sectors/ISSS/About_ISSS/Documents/cclcgd006.pdf

A3 Further Reading

National and international standards and codes of practice

AS 1428.1-2001 Design for access and mobility. General requirements for access – New building work.

AS 1428.2-1992 Design for access and mobility. Enhanced and additional requirements – Buildings and facilities.

AS 1428.3-1992 Design for access and mobility. Requirements for children and adolescents with physical disabilities.

AS 1428.4-2002 Design for access and mobility. Tactile indicators.

BS 4800: 1989 Paint colours for building purposes (whilst the colours in this standard cannot be seen on CD-ROM or online the text can still be used).

BS 5395-1:2000 Stairs, ladders and walkways – Part 1: Code of practice for the design, construction and maintenance of straight stairs and winders.

BS 5588-8:1999 Fire precautions in the design, construction and use of buildings – Part 8: Code of practice for means of escape for disabled people.

BS 5776:1996 (incorporating amendment No.1) Specification for Powered stairlifts

BS 6440:1999 (Incorporating amendment No.1) Powered lifting platforms for use by disabled persons – Code of practice.

BS 6440:1999 Powered lifting platforms for use by disabled persons – Code of practice (partially superseded by BS EN 81-40:2008. The remainder of BS 6440:1999 will eventually be superseded by EN 81-41: 2009 Safety rules for the construction and installation of lifts – Special lifts for the transport of persons and goods – Part 41: Vertical lifting platforms intended for use by persons with impaired mobility).

BS 6465-1:2006+A1:2009 Sanitary installations. Code of practice for the design of sanitary facilities and scales of provision of sanitary and associated appliances.

BS 6571-4: 1989 Vehicle parking control equipment – Part 4: Specification for barrier type parking control equipment.

BS 7036-1:1996 Code of practice for Safety at powered doors for pedestrian use – Part 1. General.

BS 7036-4:1996 Code of practice for Safety at powered doors for pedestrian use – Part 4. Low energy swing doors.

BS 7997:2003 Products for tactile paving surface indicators – Specification.

BS 8300:2009 (Incorporating amendment No.1) Design of buildings and their approaches to meet the needs of disabled people – Code of practice.

BS 8493:2008 (+A1:2010): Light reflectance value (LRV) of a surface – Method of test.

BS 8501:2002 Graphic symbols and signs – Public information symbols (AMD 16897).

BS EN 115:1995 Safety rules for the construction and installation of escalators and moving walkways.

BS EN 15838:2009 Customer contact centres, Requirements for service provision.

BS EN81-70:2003 Safety rules for the construction and installation of lifts – Particular applications for passenger and good passengers lifts – Part 70: Accessibility to lifts for persons including persons with disability.

Building Regulations (Part M Amendment) Regulations 2010 (S.I. No. 513 of 2010).

Citizens Information Board – Accessible information for all (2009).

DD 266:2007 (Draft for Development) Design of accessible housing – Lifetime home – Code of practice.

I.S. EN 1991-1-1:2002 – Eurocode 1: Actions on structures Part 1-1: General actions – densities, self weight, imposed loads for buildings (including Irish National Annex: 2005).

I.S. EN 81-1: 1999 Safety rules for the construction and installation of lifts – electric lifts (Amd 1) (+A3:2009).

I.S. EN 81-2:1999 Safety rules for the construction and installation of lifts – hydraulic lifts (Amd 1) (+A3:2009).

I.S. EN 81-70:2003 Safety rules for the construction and installation of lifts – Particular applications for passenger and good passenger lifts. Accessibility to lifts for persons including persons with disability (Amd A1:2005).

I.S. EN 997:2003 (+A1:2006) WC pans and WC suites with integral trap (AMD Corrigendum 14805) (AMD 16965).

IEC 60118-4:2006 Electroacoustics. Hearing aids. Induction loop systems for hearing aid purposes. Magnetic field strength (ISBN 978 0 580 50047 3).

International standard for Induction loops. IEC 60118-4.

Irish Code of Practice on Accessibility of Public Services and Information Provided by Public Bodies www.nda.ie/website/nda/cntmgmtnew.nsf/0/3DB134DF72E1846A8025710F0040BF3D/$File/finaldrcode_nda.htm

Key cards should conform to EN 1332. For further information on key cards please see: http://www.universaldesign.ie/useandapply/ict/itaccessibilityguidelines/smartcards/guidelines/smartcardguidelines/cards

Lifetime Homes Standard: http://www.lifetimehomes.org.uk

Norwegian Universal design of building standard, 2009.

Passenger Lift Design: The Machinery Directive 2006/42/EC; Lifts should conform to BS 6440.

National and international reference documents

2020 Vision – Sustainable Travel and Transport: Public Consultation Document. Department of Transport.

Bus Based Park and Ride – A Pilot Scheme. A Report to: Dublin Transportation Office. The TAS Partnership Limited, 2002.

City of London 2006 Facility Accessibility Design Standards. London, Canada, 2006 Promoting Safe Egress and Evacuation for people with Disabilities - National Disability Authority.

Gallaudet DeafSpace Design Guidelines 2010.

Department of Transport & the National Disability Authority Guidelines for Accessible Maritime Passenger Transport http://www.nda.ie/website/nda/cntmgmtnew.nsf/0/45AA46D1F77D7EF2802576DC005C5954?OpenDocument

Department of Transport, UK 'Traffic Signs Manual'.

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Guidance on the use of tactile paving surfaces. Department for Transport, UK.

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Inclusive Mobility. Department for Transport, UK.

International Best Practices in Universal Design. A Global review. Canadian Human Rights Commission, 2006.

Irish Wheelchair Association: Best Practice Access Guidelines 2010.

Joseph Rowntree Housing Trust.

Parking for disabled people. Department for Transport, UK.

Promoting Safe Egress and Evacuation for people with Disabilities - National Disability Authority.

Rail Park and Ride Strategy for the Greater Dublin Area. Dublin Transportation Office, 1994.

Regulation of Bus services outside the Greater Dublin Area. Department of Transport.

"Sign Design Guide and Inclusive mobility," Oxley, P. (2003), Inclusive Mobility. Department for Transport, UK. www.mobility-unit.dft.gov.uk

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