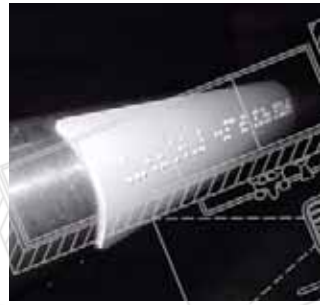
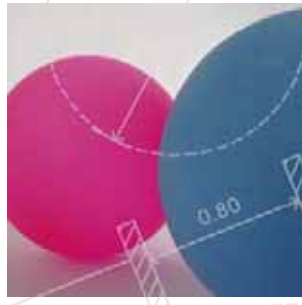




ACCESIBILIDAD

GUIDE
for companies



“States Parties undertake to ensure and promote the full realization of all human rights and fundamental freedoms for all persons with disabilities without discrimination of any kind on the basis of disability”

(Convention on the Rights of Persons with Disabilities, Article 4)

Letter from Eduardo Montes

At the Club de Excelencia en Sostenibilidad we continue to put methodologies on the market that help different business sectors improve their responsible initiatives in the social, financial and environmental realms that we live in.

In this way, the Club is taking a position as an essential agent when facilitating knowledge to businesses in key subject matters that are often difficult to integrate into the strategies of corporate responsibility. We did it in the past with the publication: “La igualdad en el marco de la Responsabilidad Corporativa” (Equality within the Framework of Corporate Responsibility) where we provided companies with knowledge about the Law of Equality.

Now it is time for a subject matter that I feel is vital: accessibility at company offices and production centers. In my management responsibilities, I have personally been a proponent of the need to adapt all of the company’s facilities to make them accessible to individuals that have some type of disability. All disabled individuals should be able to access the company’s services with the same ease as non-disabled individuals.

This thought is what led us to publish the Accessibility Guide for Businesses in order to facilitate knowledge about the subject matter in a practical way so that companies can gain firsthand knowledge of the latest trends in the topic that we are dealing with here.

I would especially like to thank the boost the Adecco Foundation, an international reference in the subject matter and from which we learn many lessons on a daily basis, has given to the project, the accessibility consulting firm Rovira-Beleta/Folch as experts in the subject matter for passing on all of their knowledge, and to the Advisory Committee to the companies of the Club that has contributed the real experiences of many companies when it comes to implementing these types of measures.

In the future, I would like for accessibility to not be a subject matter that stands out that companies would have to talk about. This would be the greatest sign that it has had an impact on organizations and that it is a cultural item that is present in the daily operations of companies and in the products, services, and solutions that they put on the market.

Eduardo Montes

President of the Club de Excelencia en Sostenibilidad

Foreword from the Adecco Foundation

The International Labor Organization defines accessibility as the right for all persons with a disability to enjoy equal opportunities and conditions in daily activities such as employment, transportation, education, recreation, and technology without any type of barrier or limitation.

The Adecco Foundation, a non-profit organization registered under the Protectorate of the Department of Labor and Social Affairs, has the objective of socio-labor integration of disadvantaged groups, among which are persons with disabilities.

Its origin, creation and purposes were defined and designed with the objective of meeting society's employment needs, bringing the most human part of the employment market to companies and helping those individuals who have the most difficult time finding a job. In this sense and under the policy of Corporate Responsibility at Adecco, a leader in the Human Resources sector, the popularization and sensitization of all social agents have become the fundamental pillars of its activity.

The support and boost given to the publishing of this guide was born out of the conviction of the importance of tackling the subject of eliminating barriers in order to attain full integration of persons with disabilities at the workplace.

Over the past 10 years, we have helped over 7,000 disabled persons to join the workforce. These results were attained due to the effort and hard work of all of the professionals that work at the foundation and at Adecco, to the support from handicapped associations and institutions, and to the commitment of companies that collaborated in attaining these goals.

The road traveled in order to meet our goals was a challenge and there were various architectural, cultural, and social barriers that we ran into along the way. However, we overcame them which enabled each individualized and personalized path to employment to reach the final goal of obtaining a job. It is an opportunity.

The dream of living in a world that is accessible to everyone and where eliminating barriers is not something new, different, or alternative, but rather something ordinary. It can be this way and become reality with initiatives such as this guide and its subsequent application in social and work environments. As long as we continue having to indicate which environments and places are or are not accessible, we will continue to live in a world of inequality.

We hope that this guide, the principles laid out in it, the compilation of basic principles, and the compendium of tools contribute to the improvement of labor conditions for persons with disabilities, drive companies' corporate responsibility policies, and thus create a more equal and fair scenario for everyone.

Emilio Zurutuza Reigosa

President of the Adecco Foundation

Participants in the project

Managers:

Francisco Mesonero Fdez. de Córdoba.

General Manager of the Adecco Foundation
Director of CSR Adecco Spain

Isabel Castillo Espinós.

Project Manager for the Club de Excelencia
en Sostenibilidad

Authors:

Enrique Rovira-Beleta.

Rovira-Beleta/Folch Accessibility Consulting

Ana Folch.

Rovira-Beleta/Folch Accessibility Consulting

Advisory Committee:

Mr. Carlos Barrero. Adecco Medical & Science

Mrs. Esther Toledo del Castillo. Alstom

Mr. David León. Cemex

Mr. Jaume Alós. Endesa

Mr. Javier Molina Rivera. Endesa

Mrs. Ana Zaldo. Ericsson

Mrs. Isabel Pertusa. Adecco Foundation

Mr. Francisco Gastón Bote. Iberdrola

Mr. Alberto Gil. ISS Facility Services

Mrs. M^a Dolores Ruano Izquierdo. la Caixa

Mr. Jordi Fabà Soldevila. la Caixa

Mrs. Gloria Barberá. PortAventura

Mr. Julio Lázaro. Orange

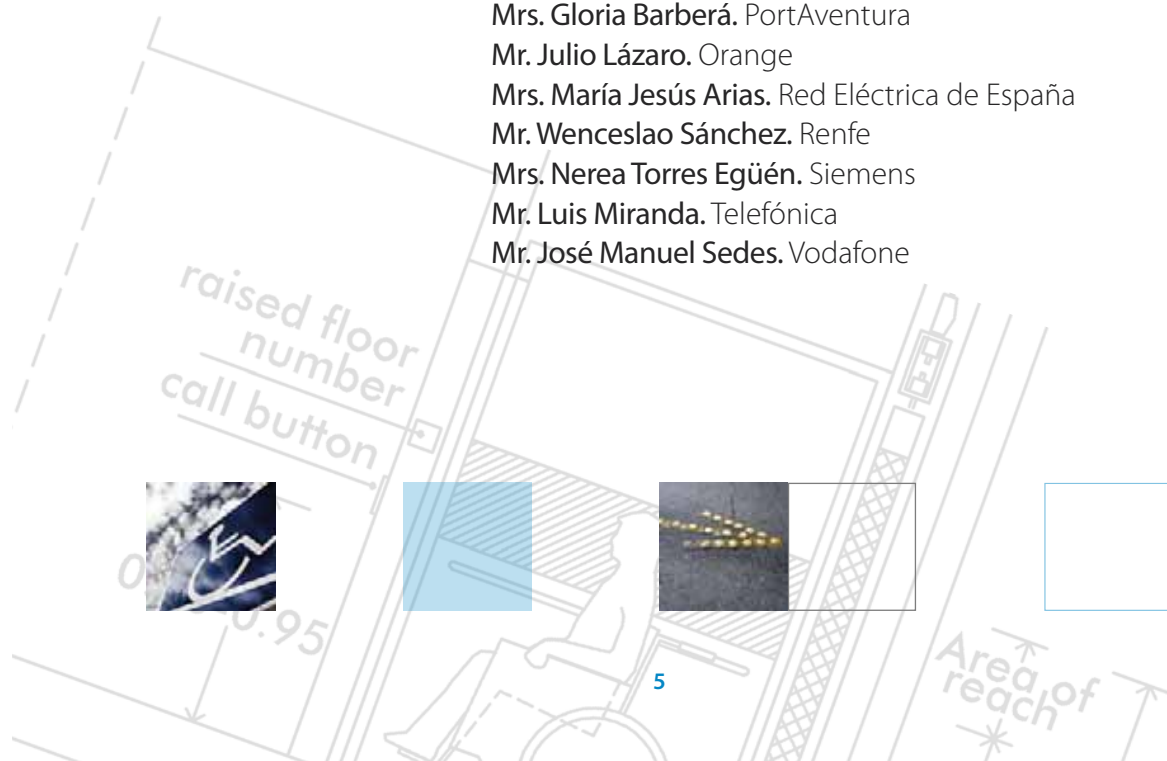
Mrs. María Jesús Arias. Red Eléctrica de España

Mr. Wenceslao Sánchez. Renfe

Mrs. Nerea Torres Egüén. Siemens

Mr. Luis Miranda. Telefónica

Mr. José Manuel Sedes. Vodafone





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introduction

Integration of individuals with some type of disability in the workplace is a problem that has yet to be solved in our society. In Spain, 9% of the population, over 3.5 million people, belong to this group. However, Spain continues to be one of the countries with the lowest vocational integration rates of the European Union.

Social integration in Spain over the past few years has progressed in the design of integration policies but “normalization” is still far off. Despite the fact that one of the main groups these social policies are aimed at are persons with disabilities.

Numerous studies show that disabled individuals are more motivated and have a higher productivity rate at their jobs than other groups. The reason for this greater degree of motivation is none other than the group’s awareness of how difficult it is for them to break into the job market and thus they appreciate it more when they are given an opportunity.

Until 30 years ago, there wasn’t a specific term to describe the group of persons with disabilities. They didn’t have access to the job market or to the social world, resigning, in most cases, to family life with hardly any contact with society.

In the early 80’s the term disabled person was coined to define this group. Even though the name indicates that disabled persons are “less able”, more protectionist measures became recognized, emerging in 1982 with the passing of the LISMI (Law of Social Integration of Disabled Persons), where productive ability and social integration began to be talked about.

At the turn of the 90’s, the word handicapped person was introduced, a term that indicates an obvious evolution but still had a connotation of being less valid. This linguistic evolution also began to be reflected in society with the group’s entry into the workplace and daily life where handicapped persons began gaining relative importance.

Finally, at the end of the 90’s, the term disabled person or person with a disability was used to refer to a group of persons that have certain abilities, but not others. After all, everyone without distinction has the ability to carry out certain tasks, but there are others we cannot do. In this way, the group equipped itself as another part of the society with equal rights and opportunities.

Even though the evolution of the term is clear, unfortunately it has only developed linguistically and conceptually. There is still a long way to go and work to do until this group attains full social and workplace integration. Society must be trained and informed regarding their abilities.

Article 49 of the Spanish Consitution was the first legislative step for social integration of disabled persons. This constitutional mandate culminated in the legislative world with the publication of Law 13/1982 of the 7th of April on Social Integration of Disabled Persons (LISMI).

For the purposes of this law, a handicapped person is “any person whose educational, labor or social integration possibilities are reduced as a consequence of a deficiency, foreseeably permanent, that may be congenital or not, in their physical, psychological or sensory abilities.”

Article 38 of the LISMI includes the precept that has given more notoriety to this Law having stipulated the obligatory nature in public companies to employ a certain amount of handicapped persons that shall be no less than 5% of the staff and 2% of the staff for private companies that have fifty employees or more.

The confirmation of the insufficient degree of fulfillment of the 5% and 2% quotas respectively in favor of handicapped workers at companies with fifty employees or more revealed the need to establish measures that promote the application of the aforementioned quota. Thus it was confirmed in 1997 for the first time when, by agreement of the Council of Ministers, a specific plan was approved whose purpose was to put into practice a series of urgent measures to promote employment of persons with disabilities.

It wasn't until 2000 that the regulations for exceptional measures were enacted. First via RD 27/2000 and later via Royal Decree 364/2005 of the 8th of April regarding exceptional, alternative measures to the fulfillment of the quotas in favor of the disabled workers at companies with 50 or more employees.

By virtue of this regulation, public and private companies that are obligated to hire handicapped workers under the terms stipulated in article 38.1 of the LISMI shall be able to apply the following alternative measures:

- Purchase of goods from a Special Employment Center or a self-employed handicapped person.
- Formalization of a civil or commercial contract with a Special Employment Center or a self-employed handicapped person for the provision of services and accessories that are outside of the company's normal business activity.
- Donation or sponsorship.
- Signing a work enclave contract.

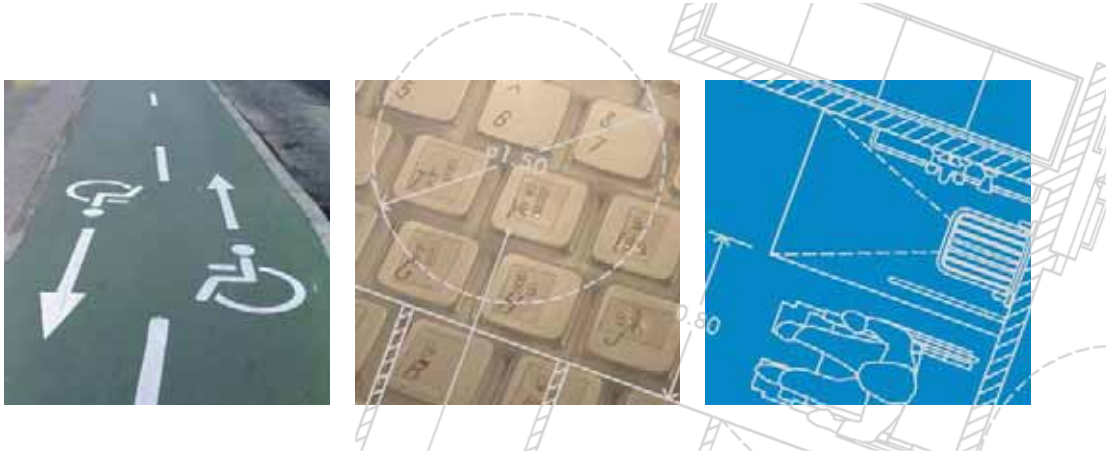
What is a special employment center?

Full integration in society cannot be attained if people do not have a stable job. Currently the Special Employment Centers represent the path with the greatest potential for attaining socio-labor integration of handicapped individuals. In Spain there are currently more than 45,000 persons with a disability that have gotten a job through the more than 1,600 existing Special Employment Centers.

Special Employment Centers are companies where a minimum of 70% of their staff are persons with disabilities and whose objective is to do productive work, regularly participating in market operations. In addition, the purpose of the Special Employment Centers is to secure a paid position and provide the personal and social adjustments their disabled workers need while at the same time being a means that enables them to integrate into the ordinary workforce.

Despite the social work the Special Employment Centers must carry out and their special characteristics, their structure and organization adapt to those of regular companies, providing services or selling products like any other company that participates daily in the market.

purpose of the Guide



Just a little over a decade ago it would have been surprising to find companies that were interested in adapting their buildings, environments, and positions for people with physical, sensory, or psychological disabilities. Things are no longer that way. This is not only due to the current laws and regulations that preserve and promote the incorporation of disabled workers in the workforce, but mostly due to the cultural change where principles of plurality and equality have become stronger in daily life and at the workplace.

It is necessary, however, to remember that article 25 of the Law of Occupational Hazard Prevention covers the protection of employees that are especially susceptible to certain hazards under the following terms:

“Employers shall specifically guarantee the protection of employees that, due to their own personal characteristics or known biological condition, are especially susceptible to occupational hazards, including those who have been recognized as having a physical, psychological, or sensory disability. Therefore, he shall take into account the aforementioned aspects in the assessment of risks and, depending on the possible risks, shall adopt the necessary preventative and protection measures.”

This section is clear enough, not only regarding the assessment of risks that these particularly susceptible individuals could be exposed to, but also regarding the adoption of preventative and protection measures.

At the same time, we know that the preventative actions are classified, according to the World Health Organization, as primary, secondary, and tertiary, wherein the primary actions are those that start with the design of the physical workplace, the furniture, the instruments, and the procedures for eliminating or avoiding hazards.

This Accessibility Guide for Businesses helps you to include prevention from the very moment you start planning the company buildings, facilities, and surroundings. If you study its content in depth, you will find a section dedicated to urban accessibility and the question may arise regarding what its application is in the realm of production or service companies. Experience has shown us that, beyond the interest that companies and public organizations responsible for urban accessibility could take in it, factories, industrial parks, and major retail outlets, are also concerned with having a rational, ergonomic design that eliminates obstacles and inconveniences not only for their customers but for their employees as well.

One observation that is closely linked to the prevention of accidents and injuries is, when planning and designing a workplace, a step is substituted by a ramp or is marked with a surface that is different at the beginning and end of a flight of stairs. The user friendliness is not limited to persons with a physical or sensory disability

but extends to people who use the facilities making them more user friendly and passable. Productivity, which should be one of the unavoidable objectives of every business, is thus reinforced by an architecture and furniture where all workers, including employees with permanent or temporary disabilities, can move about and operate with greater agility and efficiency while reducing accidents and incidents.

When you design and build, you try to standardize all of the measurements and spaces in order to provide appropriate access to everyone, keeping in mind that in the world there is already a rate of 30% of people who have temporary or permanent disabilities due to age, handicap, pregnancy, or an accident, and these people need these accessibility improvements made at their workplace and home for their self-esteem and personal mobility.

It is a subject that society is bringing up more and more since the average expectancy has increased. That is why design professionals must tackle the problem once and for all and solve it.

This Guide analyzes and includes criteria regarding the accessibility of spaces, routes, elements, furniture, products and services in our surroundings with the purpose of not only getting to know current regulations, but also mastering all of the necessary details for applying accessibility in a discrete fashion with standardized criteria and normal use designs for everyone for the elements, works, products, and services that we provide.

It is essential to train companies so that they can apply accessibility criteria to their buildings in the near future and provide areas for all employees whether they have limited capabilities or not.

A company's role is key in improving the quality of life at the workplace since it should be accessible just as a home should be and should be able to be used for a lifetime, including during phases in life when the degree of dependency of its inhabitants increases temporarily or permanently, especially with age. A company should also insert disabled persons into its positions, facilitating labor integration for all citizens and improving the comfort of its areas and services for the rest of the employees.

With this Guide, we would like to provide all companies with sufficient criteria to fulfill the current regulations regarding accessibility existing in each of the 17 Autonomous Communities, the Law of Occupational Hazard Prevention, and the Law of Social Integration of Persons with Disabilities, while checking the existing deficiencies in accessibility that companies have and proposing a series of essential or recommended improvements to them depending on their needs. Most of the situations go unnoticed to most of the customers and many of the improvements could be made at a minimal cost.

synopsis

The publication of this Guide coincides with the promotion of social matters in our environment: the Law of Dependence, the Law of Equal Opportunities, new accessibility criteria and no discrimination, etc; and also with the ageing of Spanish citizens which currently has one of the longest life expectancy rates in the world. It also coincides with the requirement to comply with the Occupational Hazard Prevention regulation due to the high rate of accidents which continues to rise each year in different work environments.

The Guide is broken up into different sections:

- **Urban accessibility**
- **Accessibility in building**
- **Accessibility in communications systems**
- **Accessible means of company transportation**
- **Accessible consumer goods, products and services**
- **Sensitization activities and training of personnel**

Individuals with a physical, sensory, or psychological disability are without a doubt the main characters of this **Guide**. Their incorporation and assimilation in the workplace is part of the modern business mentality.

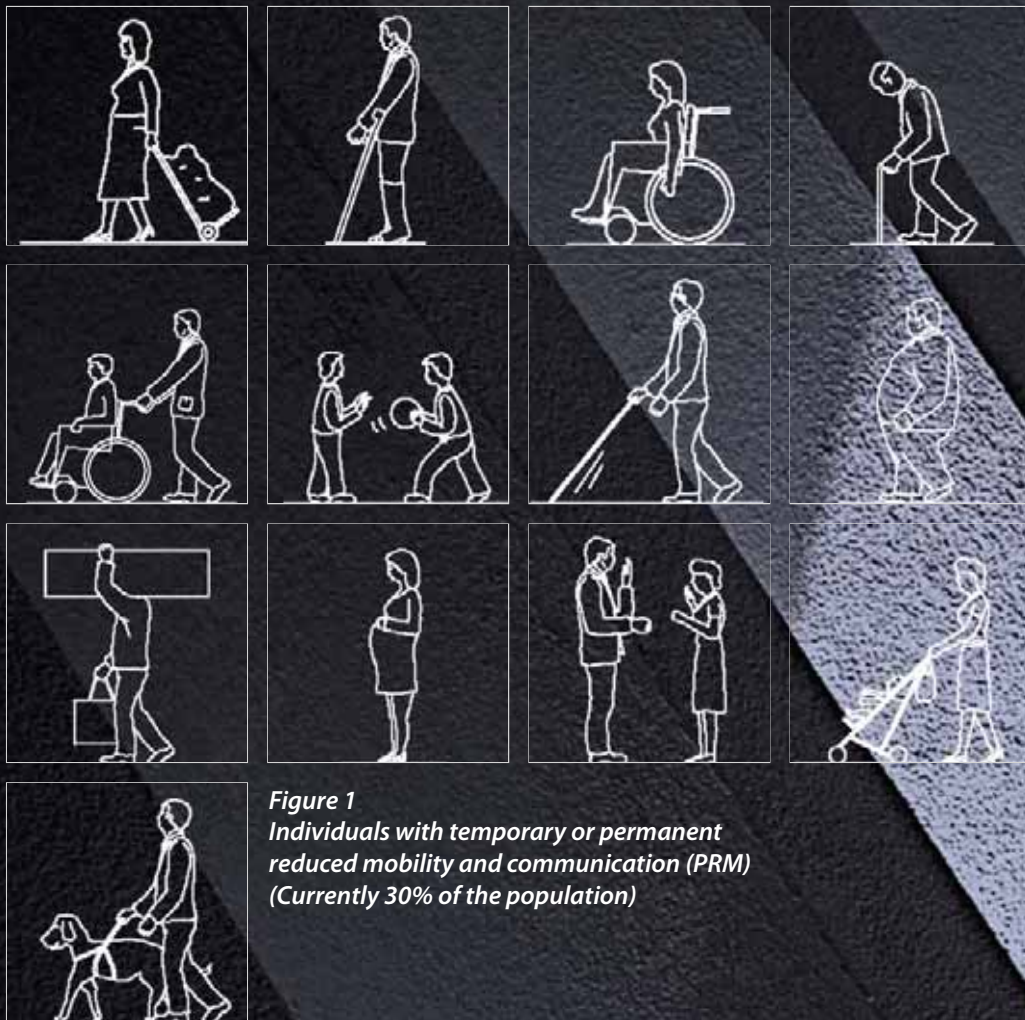


Figure 1
Individuals with temporary or permanent
reduced mobility and communication (PRM)
(Currently 30% of the population)

scope of application

Ambulatory individuals

In this group you will find people who have difficulty walking with confidence and may or may not require the use of a cane or crutches which enable them to keep their balance.

We are referring to some elderly persons whose physical abilities have diminished with the passing of time and who walk slowly with little stability.

We also refer to those who have a physical limitation in their legs due to a disease such as poliomyelitis, hemiplegia, or an amputated leg. Other people that fit into this category are those who have gotten into an accident and have a cast on their ankle or leg, a person who is very obese and has difficulty walking, etc.

The main problems that affect this group of people are:

- Difficulty getting around:
 - Difficulty getting up steep inclines, isolated differences in level, and stairs due to lack of strength and balance.

- Difficulty getting through narrow areas.
- Difficulty walking long stretches without resting.
- Greater danger of falling because their feet tripped or cane slipped.
- Difficulties of use:
 - Difficulty opening and closing doors, especially if they have automatic closing mechanisms.
 - Difficulty keeping their balance.
 - Difficulty sitting down and getting up.
 - Difficulty activating mechanisms that require both hands at once.

Individuals who use a wheelchair

In this group you will find people who use a wheelchair to get around because they cannot walk on a permanent or temporary basis.

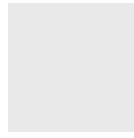
Depending on their disability, they may require help from another person to push the wheelchair which has led to the existence of various types of wheelchairs: manual, motorized, folding, etc.

Wheelchair users are generally paraplegics, tetraplegics, or hemiplegics due to a congenital deficiency, a disease or an accident. It also includes persons with cerebral paralysis whose injury is to a certain part of the brain which affects their ability to walk. Also, there are those who use a wheelchair temporarily or occasionally. For example, elderly people may use one in order to keep from getting tired when needing to travel long distances or people with walking difficulties may use a wheel chair at times and a cane or crutches at times depending on the situation.

All wheelchair users will more or less experience the same difficulties although the mobility they have in their torso and upper body make a difference when they want to do something more or less independently: propelling their own chair, getting over a small step on their own, getting out of their chair and into a bed, writing, eating, participating in a sport...

The main problems that they encounter when using the urban environment are:

- Difficulties getting around:
 - Cannot get up isolated differences in level, stairs and steep inclines.
 - Danger of tipping over (on stairs, thresholds, etc.).
 - Cannot get through narrow places.
 - Need for wide spaces to turn, open doors, etc.
- Difficulties of use:
 - Their ability to reach objects is limited.
 - Their range of vision is limited.
 - Difficulties because their own legs represent an obstacle.
 - Compatibility problems with their wheelchair and other furniture.



Persons with sensory disabilities

In this group you will find all individuals that have some type of visual or hearing disability to some degree. You shouldn't think that these are only people who are blind: blind individuals or people who are deaf: profoundly deaf. All persons that have reduced hearing or vision that is below the standard are in this group.

The type of difficulties that persons with **visual disabilities** can have vary:

- Relating to communication: reading a catalog, the menu in a restaurant, or messages over the public address system, etc.
- Orientation or coping: recognizing the button of the floor they seek in an elevator or identifying the location where they are, etc.
- Safety: not detecting objects that protrude from the walls or tree branches or the existence of a step, etc.

Persons with some type of visual deficiency have limited mobility based on:

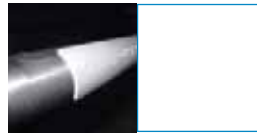
- Difficulties getting around:
 - Problems detecting obstacles (differences in level, protruding elements, holes, etc.).
 - Difficulties determining directions and following routes.
- Difficulties of use:
 - Limitations for obtaining graphic information (written info, graphic images, colors, etc.).
 - Difficulty locating numerous objects (button panels, door knobs, handles in general, etc.).

The same happens with persons with **hearing disabilities**: there are profoundly deaf persons that do not hear anything at all and individuals who have hearing loss because their hearing is below the norm. There are persons who were born deaf, those who became deaf after they learned how to speak, those who have lost their hearing over the years, and those who had an accident which rendered them deaf.

Thanks to advances in technology and speech therapy, there are less and less cases of deaf-mute individuals. Most deaf people know how to speak, read lips, or use sign language.

Those who have hearing difficulties can also encounter problems related to communication because, in many cases, these individuals go unnoticed to those around them because their disability is not as obvious as others.

- Not hearing announcements made over the public address system in a noisy environment like a train station or an industrial warehouse.
- Not hearing well what is being said to them if the other person is not looking at them so they can clearly see the lips of the person speaking.
- Not hearing building evacuation alarms in case of emergency.
- Not answering the door of their room when knocked on, missing out on the explanations of a guide in a tour in a museum or at a monument, etc.



Being that communication is their main problem, this also creates:

- Difficulties getting around:
 - A sense of isolation with regard to their surroundings.
 - Limitations in understanding signals or acoustic warnings.
- Difficulties of use:
 - Problems getting information offered via acoustic signals (voice, alarms, bells, etc.).
 - Limitation of the ability to relate to others or converse with them.
 - A sense of isolation with regard to their surroundings.

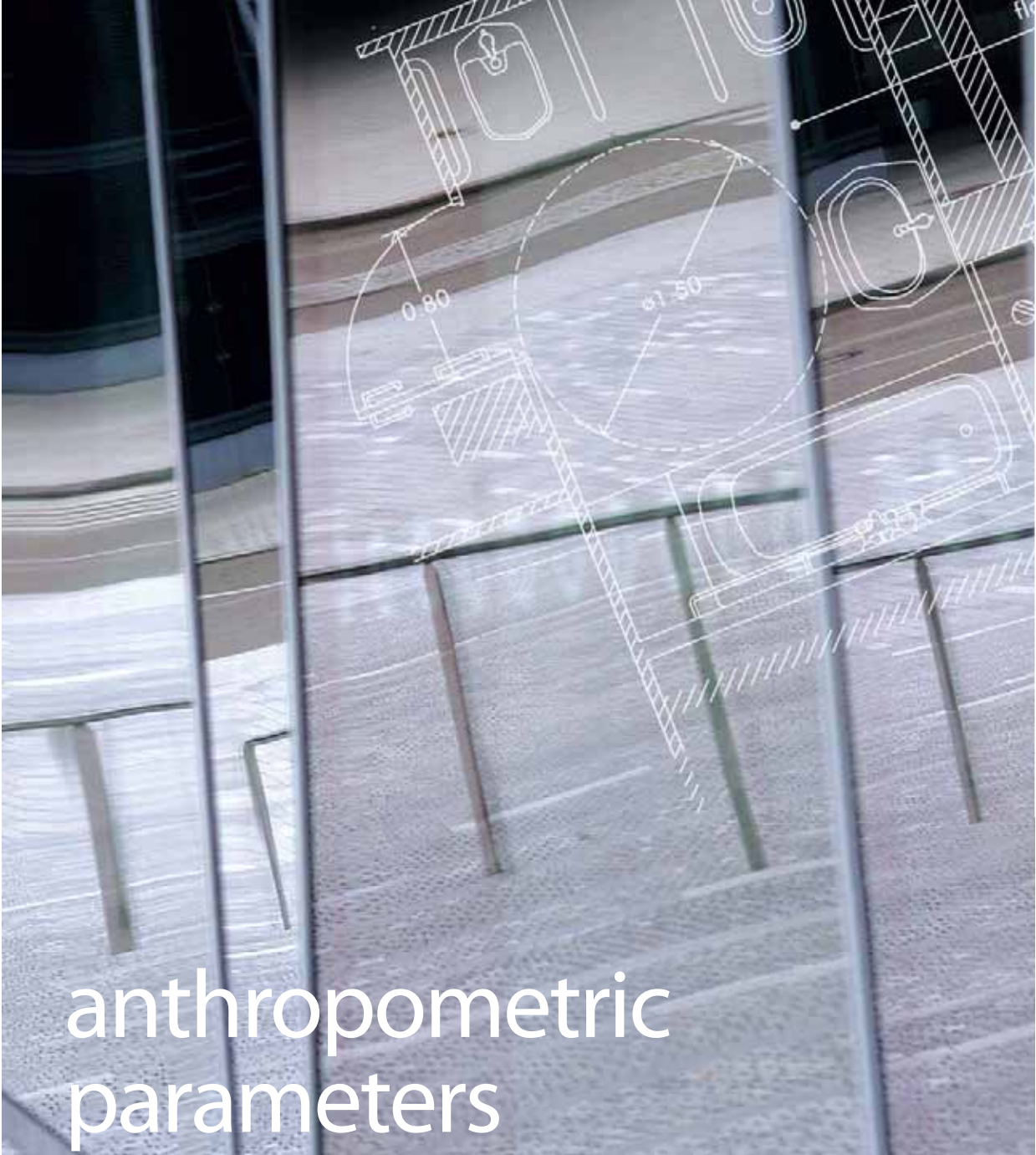
Persons with intellectual disabilities

In this group you will find all of the persons whose intellectual development is different from that which corresponds to their age. All of them have one thing in common in that sometimes they may have difficulties communicating, making themselves understood, finding their bearings in situations that they are not familiar with, or they may simply behave in a way that is not expected of someone their age.

Other persons with mobility and/or communication difficulties

In this section you will find all of the persons that have a special need due to various causes or situations: someone who travels with large or heavy baggage in the corridors of an airport; a person who is carrying a baby in their arms or pushing a stroller and encounters the same obstacles that a person in a wheelchair does; children that encounter facilities or objects that were not designed in a way that takes into account their height, strength...; a pregnant woman that simply needs more space to move around in a small toilet stall; an obese person that needs a larger seat in order to make himself comfortable in a means of transportation; someone who has had a hand or arm amputated and that cannot work certain mechanisms by themselves; an elderly person with Alzheimer's that has memory or disorientation problems and can get lost in the halls of a hotel; a very tall person that needs a special bed or that may bump into objects that are not located at the proper height such as awnings or signs on the sidewalk...

We could make an endless list of subjects and situations dealing with daily life and their work where problems related to mobility and communication could arise.



anthropometric parameters

We all look alike, but we are different. Just ask those who are over 2 meters tall or who have big feet or who are heavyset or short.

That is why those who have temporary or permanent disabilities and persons with reduced mobility (hereinafter PRM) and/or who have sensory limitations, need designers to be properly informed on their needs and abilities, and thus the dimensions in order to design and build areas, routes, elements, homes, buildings, means of transportation, communications systems, furniture, products, and services with all of the users of this diverse society in mind, thus resolving difficulties to maneuver, overcome differences in level, resolve difficulties reaching things, control difficulties with standardized use solutions, that everyone will use without it being noticed in many cases that it was designed to be used by people with severe disabilities.

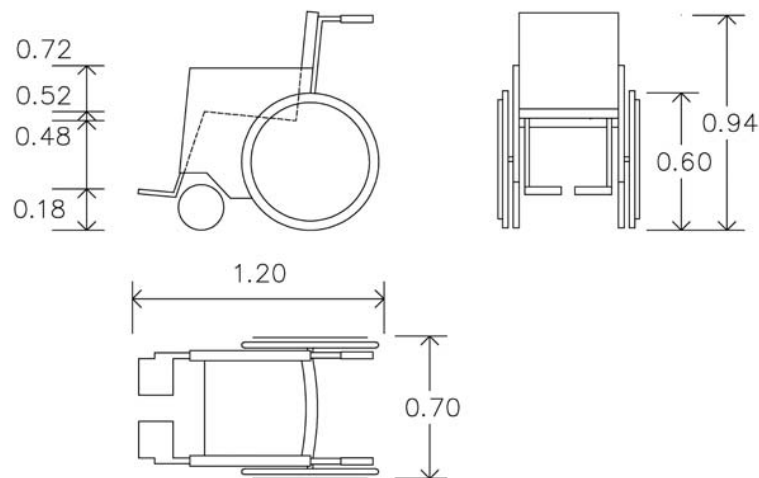
In general, the anthropometric data of an ambulatory individual who has difficulty walking, uses a cane, or has vision or hearing deficiencies is comparable to that of a person who has full use of all of his abilities.

So, a person using walking sticks on both sides in order to enable them to get around needs an obstruction free minimum width of 0.90 m. However, persons

with serious mobility problems and/or those who use a manual or electric wheelchair to get around need different dimensions:

- Height of their eyes from 1.10 m to 1.25 m.
- Height of their legs and knees from 65 cm to 68 cm.
- Height of the ends of their feet from 20 cm to 22 cm.
- Reach to grab objects between 0.40 m and 1.40 m high.
- Minimum obstacle free width of 80 cm.
- Wheelchair length feet from 0.95 m to 1.20 m.
- Height of the seat from 48 cm to 52 cm.
- Minimum height of the pedals from 18 cm to 21 cm.
- Height of armrests from 65 cm to 72 cm.
- The total height of a wheelchair is 90 cm. The pedals and armrests have an adjustable height and can be removed in order to transport the wheelchair better in a vehicle or in order to make the user's mobility in certain situations better such as entering a small elevator.

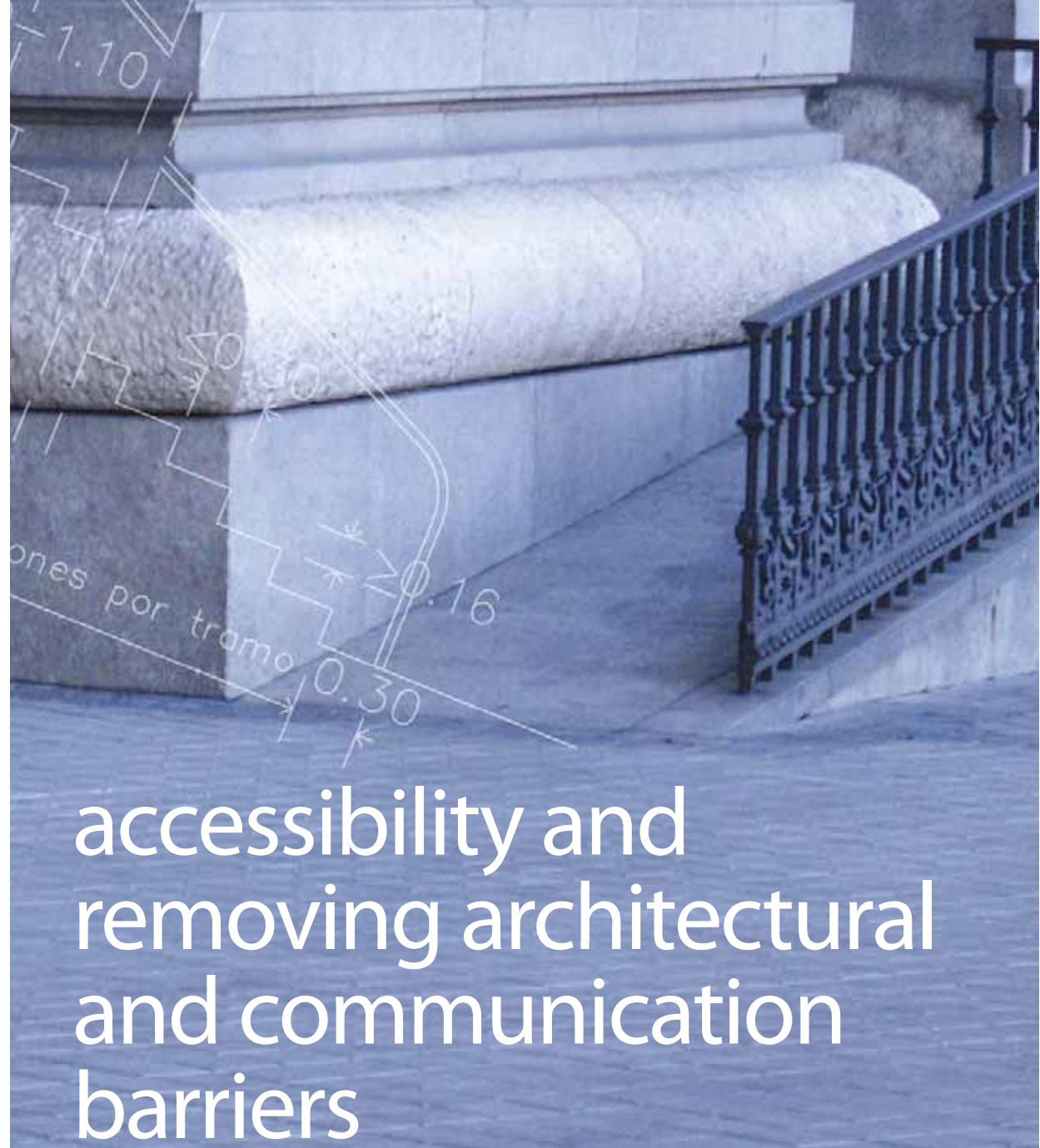
Figure 2 *Wheelchair dimensions*



These new measurements in accessible architecture and design are based on the dimensions of persons with great motor and/or sensory limitations.

If a person in a standard wheelchair (1.20 m x 0.70 m) sets the standard of the space necessary for everyone then surely we could all use these spaces easily without even noticing (only 2 cm could make the difference between a user of a wheelchair being able to get through a door or not).

It is easier for all of us to find our way around if we mark doors, windows, and paths by using contrasted colors and/or different textures. And if when we ask for information it is given to us orally and in writing, this makes it so that everyone can understand it, even persons with hearing, vision, and/or mental disabilities.



accessibility and removing architectural and communication barriers

What are architectural and communication barriers?

They are physical and/or sensory encumbrances, impediments or obstacles that limit or impede people's freedom of movement, communication and independence. They are classified as:

UAB: Urban Architectural Barriers. These are barriers that are on the public thoroughfare and outdoor public use areas. They can be resolved by means of urban accessibility.

ABB: Architectural Barriers in Public or Private Building. These are barriers that are found inside buildings. They can be resolved through accessibility in building.

TB: Transportation Barriers. These are barriers that are found in means of transportation. They can be resolved through accessibility in transportation.

CB: Communication Barriers. These are impediments to expressing and receiving messages via mass communication or normal communication. They can be resolved through accessibility in communication.

What is accessibility?

Accessibility is a characteristic of urban planning, building, means of transportation, communications systems, furniture, products, services, and everything that surrounds us that provides any individual access and maximum personal independence no matter if they are disabled or not.

At the turn of the 21st century, the concept of “removing architectural barriers” was already known and many countries have compulsory regulations on the subject. But we should promote accessibility in a discrete manner in all designs in order to improve comfort for all citizens and especially since they are getting older and older. Currently more than 30% of the population has either temporary or permanent reduced mobility and/or communication.

Therefore, if we design our surroundings with those who have limitations in mind, we will undoubtedly improve our quality of life because where someone in a wheelchair can get by safely, everybody can get by more easily. And if we think about signing that is suitable for persons with vision and/or hearing deficiencies, then surely those of us who hear and see well will be able to do it better. And most of all, if we keep in mind that when we grow old, we will be able to have a much more independent lifestyle than our parents because of these solutions that have been adapted for people with disabilities.

Good accessibility is present but goes unnoticed to most users.

At the International Expo of Zaragoza 2008, most of the attendees were not aware of the accessibility of the fairgrounds, pavilions, buildings, and displays. However, nowadays these places are equipped with crosswalk curb ramps, ramps, and railings and footbridges to access the different levels of the pavilions, flat footpaths in the facilities and cultural or commercial equipment, 6 person elevators, stairwells with handrails, accessible restrooms, halls and doors that are the proper width, subtitling of videos, audio description, vertical or inclined lift platforms, magnetic loops, etc.... These things are regularly used by everyone and can even be used by persons with reduced mobility and/or sensory limitations and persons with serious disabilities because they have sufficient space and precise signage to do so.

The new challenge for all employers, technicians, and individuals involved in the environment we live in is to make a: **“Design for everyone”, an accessible design** that improves everyone's quality of life.

Levels or degrees of accessibility

Accessible areas, paths, or elements are those that take into account the diversity of users when it comes to dimensions, age, ability, strength, and other characteristics, adjust to people's needs and human limitations depending on their age, permanent or temporary reduced mobility, communication difficulties, etc, improving the quality of life for all users and thus last throughout the different phases of life.

- **Adapted:**

These are areas that have been adapted to the functional and dimensional requirements that guarantee freedom and comfort of use to persons with reduced mobility or communication or any other limitation.

- **Passable:**

These are areas that, without having been adapted to the aforementioned requirements, do not impede freedom of use but allow sufficient comfort for persons with reduced mobility and/or communication or any other limitation.

- **Visitable:**

These are areas that, without having been adapted to the aforementioned requirements, do not impede occasional use, independently or with minimal help from a third party, by persons with reduced mobility and/or communication or any other limitation.

- **Convertible:**

These are areas that could be transformed into passable or visitable areas with simple, insignificant, low-cost modifications that do not change the fundamental layout.

- **Inaccessible:**

These are areas, paths, or elements that do not allow use, independently or with minimal help from a third party, by persons with reduced mobility and/or communication or any other limitation.



Main difficulties for the independence of persons with disabilities

Difficulties are defined depending on the physical and sensory conditions of individuals and it is understood that they are generally encountered when individuals make use of their environment.

Limitations are not associated to all of the different types of buildings, but rather the individuals that move about and work in them. It is when they are using the buildings that their limitations are generally seen. These limitations could be one or more of the following types:

Mobility

The act of getting from one place to another (either horizontally or vertically). These limitations especially affect persons using a wheelchair and those who have difficulty walking:

- **Moving in a straight line**, moving forward or backwards.
- **Turning or changing** direction without moving, that is to say, practically without moving the center of gravity.
- **Turning or changing** direction while moving.
- **Getting through a door**. Specific maneuver that includes movements necessary for approaching a door, opening it, going through it, and closing it.
- **Transfer or movement** to sit down or get out of a wheelchair.
- **Continuous differences** in level are mainly found on the public thoroughfare and open spaces and usually follow the topographical conditions rather than the planning intent.
- **Steep, isolated differences** in level are not generally due to a clear planning intent: avoiding water getting in (in accesses from outside to covered areas), separating and protecting (for sidewalks), or creating a specific configuration (staircase, steps, etc.)
- **Sharp differences** in level due to topographical conditions or more frequently due to multi-levels (buildings with more than one floor).

Localization

Action of finding out the specific location of where something or someone is. The limitations here mainly affect persons with sensory disabilities (vision and hearing) and wheelchair users.

There are four different types of reach difficulties:

- **Manual** difficulties that fundamentally affect wheelchair users because they are in a sitting position which reduces their ability to reach things located in high places and because their legs and wheelchair are obstacles to their approach.
- **Visual** that primarily affect persons with visual deficiencies, disoriented persons, and wheelchair users since their height and their angle of vision are reduced because they are sitting.

- **Hearing** that primarily affect individuals with a reduction or loss of hearing capabilities.
- **Orientation** due to a lack of visual and audible signage. It affects all types of users that have or do not have a disability.

Communication

Action of exchanging information needed for carrying out an activity. The limitations relating to communication mainly affect persons with sensory disabilities (vision and hearing).

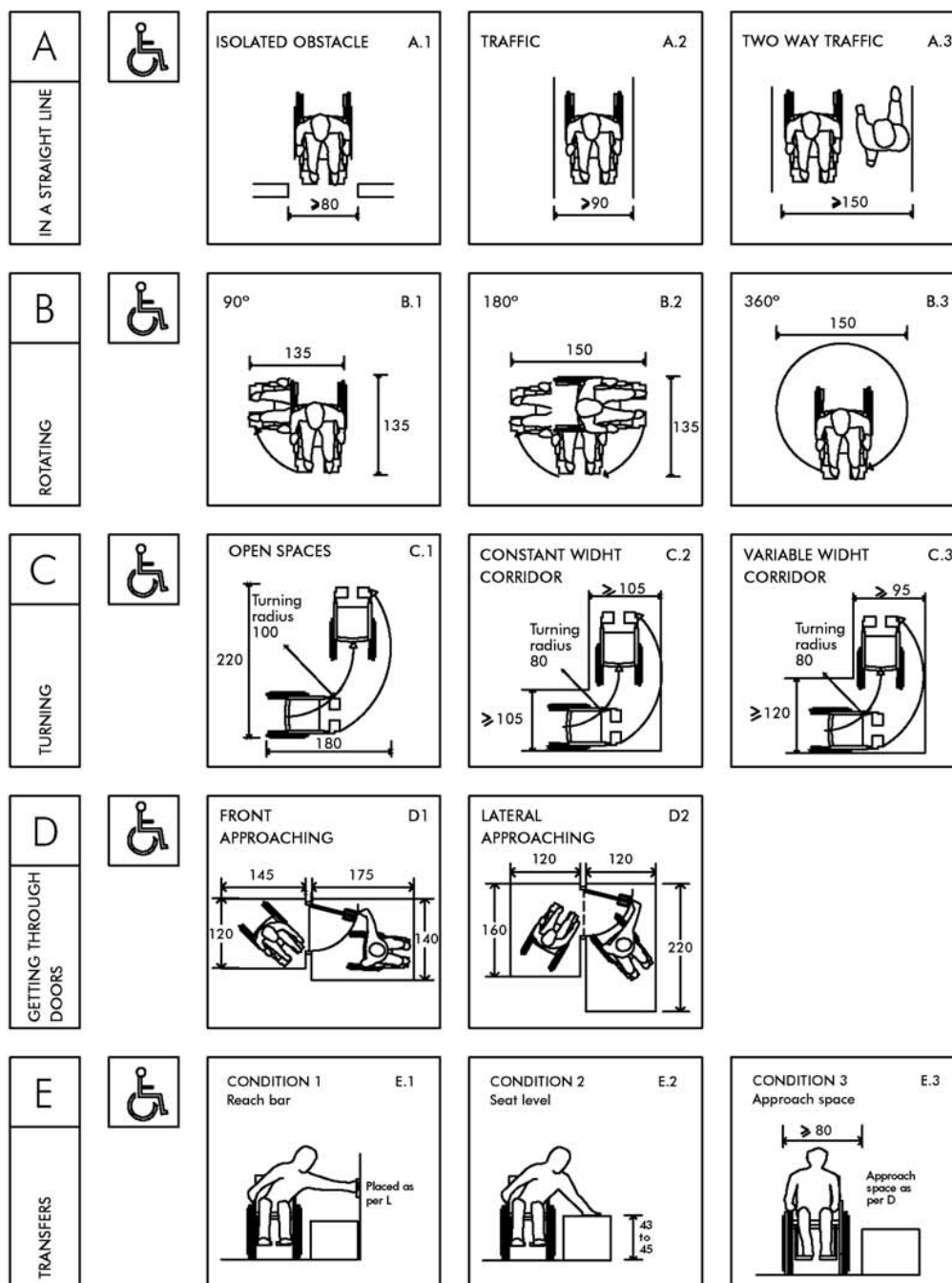
- Accessing and enjoying the goods and services that are offered through information means and communication mechanisms that are suitable for everyone (visual, hearing, tactile, fragrant, etc).

Grasping

Action of grabbing or taking hold of something. There are two different types of control difficulties:

- **Balance** difficulties that show when getting in and maintaining a certain posture and affect wheelchair users and mobile individuals as a consequence of damage to their lower limbs.
- **Handling** difficulties that are associated more with damage to upper limbs and products that must be grasped and due to their characteristics: the volumes, shapes, and weights of objects.





Documentation written for the "Course on Accessibility to your Physical Surroundings" by Xavier García-Milà, architect and member of the Royal Board on Disabilities (Spain)

Recommendations. Rovira-Beleta, architect. Diagram E2

www.rovira-beleta.com

Resolving difficulties in reaching things

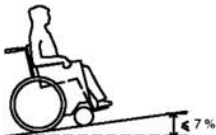
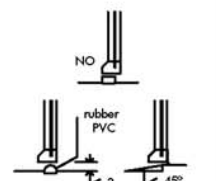
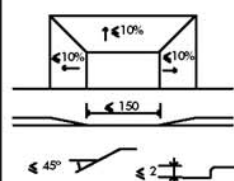
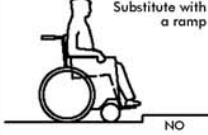
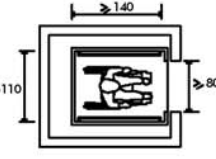
F		ON THE HORIZONTAL PLANE F.1 Comfortable working plane height	ON THE HORIZONTAL PLANE F.2 Range of reach in the working plane	ON THE HORIZONTAL PLANE F.3 Space below the working plane
		ON THE VERTICAL PLANE F.4 Heights	ON THE VERTICAL PLANE F.5 Non-useful distance	
G		OUTSIDE G.1	ON THE HORIZONTAL PLANE G.2	ON A MIRROR G.3 Only in buildings meant for persons with severe disabilities
VISUAL		DETECTING OR AVOIDING OBSTACLES G.4	DETECTING OR AVOIDING HOLES G.5	DETERMING DIRECTIONS G.6
H		COMMUNICATING WITH THE SURROUNDINGS H.1	GETTING GRAPHIC INFORMATION G.7	

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Recommendations. Rovira-Beleta, architect. Diagram G3

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Resolving difficulties in overcoming differences in level

I	CONTINUOUS		ROUTE With longitudinal slope I.1 	ROUTE With cross slope I.2 	SLOPED ROUTE Dimensions I.3 Width as per A + 10% Maneuvering areas 90° turn as per C + 10% rotation as per b + 10% Area for crossing through a door as per D on flat ground
					
J	SHARP		THRESHOLD J.1 	CROSSWALK J.2 	ISOLATED J.3 
					
K	BIG DIFFERENCE IN LEVEL		ELEVATOR K.1 Car dimensions 	ELEVATOR K.2 Car layout and landing 	ELEVATOR K.3 Other conditions: Waiting landing dimensions as per D Button panel placed as per F on a vertical plane Handrail inside the elevator car available as per L
					
			RAMP K.4 Useful longitudinal slope for differences in level ≤ 3 m Slope as per length of section L ≥ 5, x ≤ 6% L ≥ 6, x ≤ 8% L ≥ 9, x ≤ 10% 	RAMP K.5 Cross slope 	RAMP K.6 Other conditions Width as per A + 10% Maneuvering areas as per B, C, and D on flat ground Intermediate landings in the direction of traffic ≥ 150 Handrails on ramps with slope of ≥ 6% as per L Non-slip floor
					
			STAIRS K.7 Steps No protrusions or lack of continuity between tread and rise 	STAIRS K.8 Other conditions Stair width ≥ 90 Handrails as per L Maximum number of steps without an intermediate landing is 12	

Documentation written for the "Course on Accessibility to your Physical Surroundings" by Xavier García-Milà, architect and member of the Royal Board on Disabilities (Spain) Recommendations. Rovira-Beleta, architect. Diagram J2, K1 and K5

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L BALANCE		HANDRAILS Features Lower portion solidly fastened Section that is equivalent to a round pipe 4 to 5 cm in diameter Separation ≥ 4 On both ends	L.1	HANDRAILS Placed on ramps or landings On both sides 	L.2	HANDRAILS Placed on the stairs 	L.3
		BARS Features Solidly fastened Sección Ø 4 a 5 Separation from obstacles ≥ 4 	L.4	BARS Placement in restroom and transfers 	L.5	BARS Placed in the bathtub 	L.6
		FLOORING Non-slip 	L.7	FLOORING Compact and constant 	L.8	FLOORING Fastened to the supporting medium 	L.9
		SWITCHES AND HANDLES Placement As per F (manual reach) on a vertical plane	M.1	SWITCHES Features 	M.2	HANDLES Features 	M.3
		FAUCETS Placement As per F (manual reach) on a horizontal plane	M.4	FAUCETS Features 	M.5		

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Recommendations. Rovira-Beleta, architect. Diagram L1, L1 and L5

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principles of universal design

The concept arose out of designing without barriers, accessible design, and assistive technology. Unlike these concepts, its scope covers the entire spectrum of accessibility, including individuals who don't have it. Also, it takes into account the manner in which a product and its image are sold so that, in addition to being accessible, they can be sold and attract the entire range of consumers.

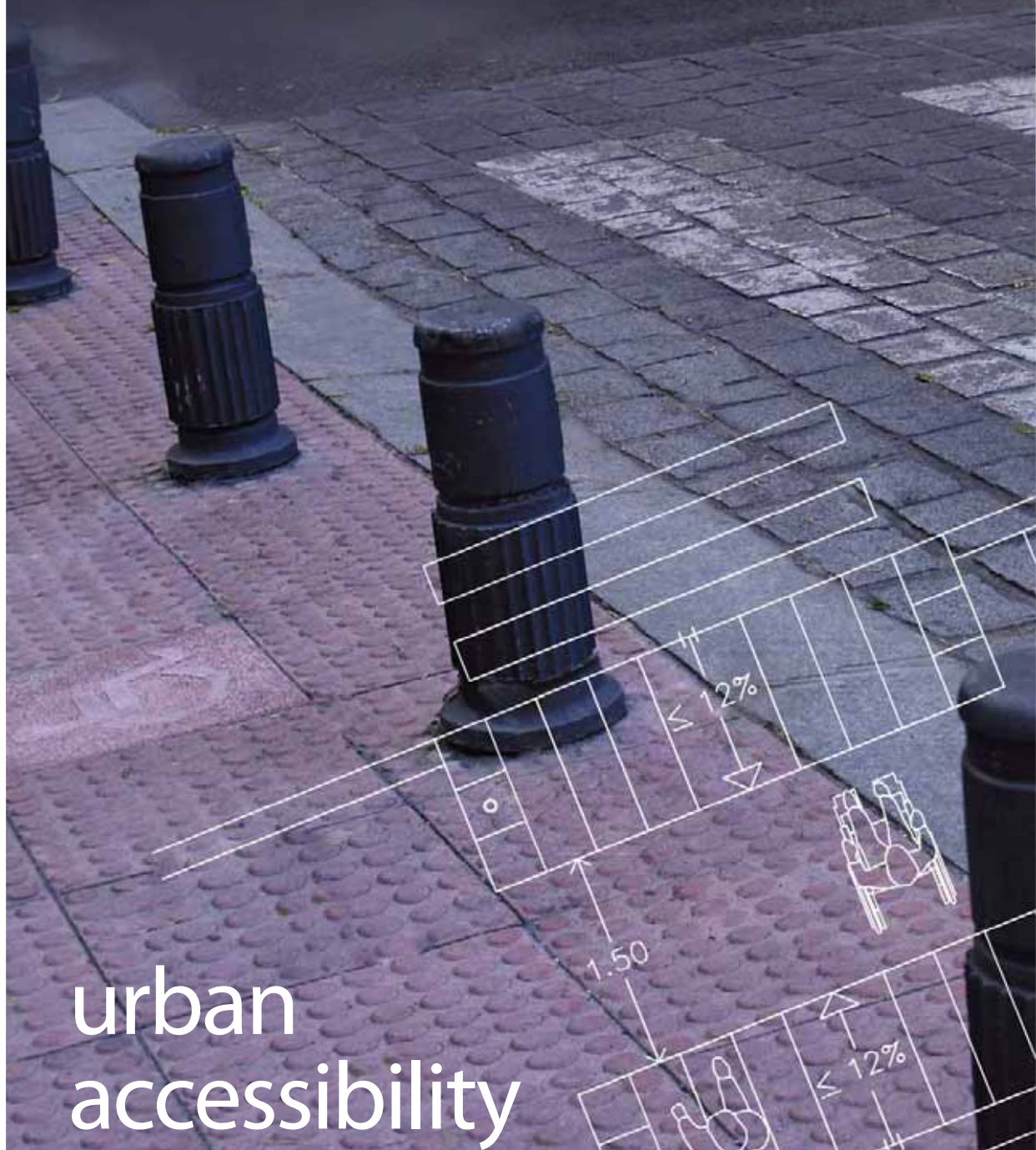
The purpose of Universal Design is to simplify the carrying out of daily tasks through the building of products, services, and environments that are effortless and simpler to use for everyone. That way they benefit people of all ages and abilities.

A group of architects, product designers, engineers, environmental design researchers, and other technicians specialized in accessibility and ergonomics have worked together in order to establish the following principles of universal design as a guide in a range of design disciplines including the environment, products, and communications according to the following principles:

- **Equitable use:** the design must be easy to use and appropriate for all individuals independently of their capabilities and abilities:
 - That provide the same manner of use for all users: identical wherever possible, equivalent when not.
 - That avoid segregating or stigmatizing certain users.
 - The features of privacy, guarantee, and safety must be equally available for all users.
 - The design should be attractive to all users.
- **Flexibility:** the design must be able to be adapted to a wide range of preferences and individual abilities:
 - That offers choices in the methods of use.
 - That can be accessed and used with the right hand or the left.
 - That facilitates accuracy and precision to the user for carrying out different tasks.
 - That adapts to the user's pace and rhythm.
- **Simple and intuitive:** the design must be easy to understand independently of the user's experience, knowledge, abilities, or level of concentration:
 - That eliminates unnecessary complexity.
 - That is consistent with the user's expectations and intuition.
 - That adapts to a wide range of literacy and linguistic abilities.
 - That provides information in a manner that is consistent with its importance.
 - That provides efficient warnings and response methods during and after the task is finished.
- **Perceptible information:** the design must be able to exchange information with the user independently of the environmental conditions or sensory abilities of the user:
 - That uses different ways of redundantly presenting essential information (graphic, verbal, or tactile).
 - That provides sufficient contrast between essential information and its "background".
 - That increases legibility of essential information.
 - That differentiates items in ways that can be described (for example, that makes it easy to give instructions or directions).
 - That is compatible with various techniques or devices used by persons with sensory disabilities.

- **Tolerance for error:** the design must minimize the accidental or inadvertent actions that could have fatal or undesired consequences.
 - That has the items to minimize risks and errors: most used items, more accessible; and the dangerous items are eliminated, isolated, or covered up.
 - That provides warnings about dangers and errors.
 - That provides safe cancellation features.
 - That discourages unconscious actions in tasks that require care.
- **Low physical effort:** the design must be used efficiently and effortlessly as possible.
 - That enables the user to maintain a neutral body position.
 - That reasonably uses the necessary strength for operating it.
 - That minimizes repetitive actions.
 - That minimizes continuous physical effort.
- **Appropriate dimensions:** the sizes and areas that must be adapted for reach, handling, and use by users, independently of their size, position, and mobility.
 - That provides a clear line of sight to important items for users that are seated and standing.
 - That the reach of every component is comfortable for all users that are seated or standing.
 - That adapts to hand or handle size variations.
 - That provides the necessary space for using technical assistance or help staff.





pathways to all persons, you must take into account the following sections:

Pedestrian routes

These routes must have a minimum 1.00 m width and 2.20 m height throughout that is obstacle free in order to ensure that all users may freely move about without risking any incidents.

If the route is 1.20 m wide, a wheelchair user can turn 360° with a bit of difficulty.

If the route is 1.50 m wide, two-way traffic would be possible and a walking individual and wheelchair user could cross paths comfortably. Also, a wheelchair user could comfortably turn 360°.

If this route is 1.80 m wide or greater, it would enable two wheelchair users to comfortably cross paths.

Figure 3 Pedestrian routes

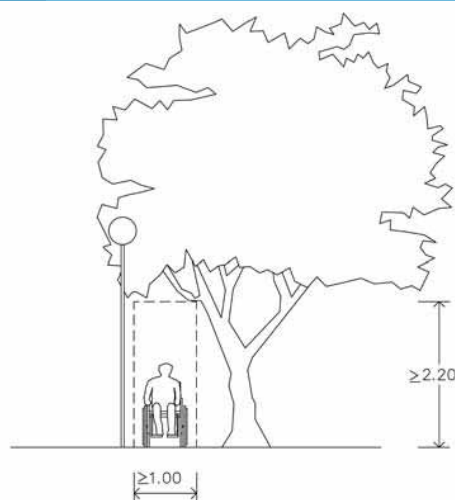
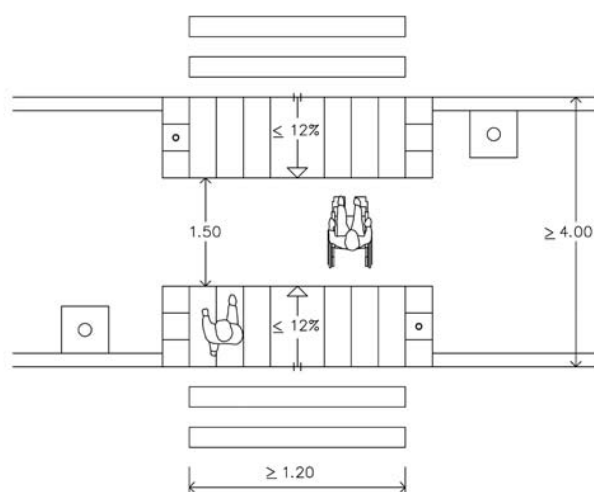


Figure 4 Crosswalks with curb ramps



Protruding or overhanging elements

All of the elements along this accessible route that jut out or protrude more than 15 cm and are lower than 2.20 m high must have their perimeter marked on the floor so that persons with visual disabilities and those not paying attention do not run into them. Or, different items must be placed below them that help these individuals avoid hitting them such as trashcans, ashtrays, planters, street furniture, etc. Their edges must be rounded in order to avoid hard blows.

Other items that are less than 2.20 m high and could be an obstacle are: staircases that you can walk under, vending machines, air conditioners, telephone booths, slanted tree trunks, slanted fastening cables, etc.

The following shall be higher than 2.20 m: high branches of trees, awnings and canopies, traffic signs and other signing, etc.

Maximum longitudinal slope

This shall depend on the length of the route:

- If the length of the route is up to 3 m, the longitudinal slope shall be between 8% and 10% so that it is accessible to PRMs (Persons with Reduced Mobility).
- If the length of the route is between 3 m and 6 m, the longitudinal slope shall be between 6% and 8% so that it is accessible to PRMs.
- If it is longer than 6 m, the longitudinal slope shall be a maximum of 6% so that it is accessible to PRMs with 1.50 m wide rest landings every 9 m.

Maximum cross slope

It shall be a maximum of 2%. If that limit is exceeded, PRMs using wheelchairs will have a difficult time using the route because the wheelchair will constantly change direction due to the excessive slope.

Isolated differences in level

Accessible routes should not include any staircase or isolated step if they do not have a gradual ramp. No protrusions shall be allowed. The adjacent surfaces should be marked by a different color and texture.

Mixed pedestrian and vehicle routes

Width

They must have an obstacle free minimum width of 3.00 m and height of 3.00 m throughout in order to facilitate the movement of vehicles for loading and unloading.

Areas for turning around

The turning areas for vehicles shall allow a minimum 6.50 m radius with respect to the axis of the route.

The same characteristics shall be used for the pedestrian routes for: **protruding or overhanging elements, maximum longitudinal slope, maximum cross slope, and isolated differences in level.**

Paving

- Shall be hard, smooth, non-slip, and firmly fixed to the ground without any protrusions other than those from the carving of the pieces. The joints between the different pieces shall be flush with the surrounding paving and shall not have any grooves. Paving covered with a layer of road oiling or similar product is allowed in parks and gardens with compacted ground with more than 90% compacting.
- Loose gravel is prohibited on accessible routes.
- Cobblestones or pieces of rock alternating with grass are not recommended because they are very uneven and hinder the balance and traffic of PRMs.

There are a minimum of four types of textures in paving public walkways for accessible routes:

- The texture of the paving of the sidewalk.
- The texture of the paving of the road.
- The texture of the paving of the access ramps and crosswalks.
- The texture of the guide strips for persons with visual disabilities.

These guide strips facilitate detection and orientation of these routes for all users, especially persons with visual disabilities. They are usually a minimum of 40-50 cm wide and have a color and texture that is different from the surrounding paving, joining a minimum of two points. Possible changes in direction should be marked with a square or similar shape on the pavement in order to guide blind individuals.

Curb ramps

There should always be an obstacle-free accessible route with a minimum 1.00 m wide and 2.20 m high in front of the curb ramp in both directions so that PRMs that use wheelchairs can maneuver easily and also so that everyone walking on the sidewalk is not affected by the slope of the curb ramp.

If the sidewalk is 1.00 m wide, it shall have a minimum 1.50 m wide obstacle-free area that is flush with the road and with paving that has a different texture from the rest that coincides with the crosswalk and allows PRMs to turn right and/or left. Even wheelchair users can access the curb by means of even sloped ramps that are less than 12% grade. In this case, warning strips shall not be placed there for persons with visual disabilities because they cannot be placed perpendicular to the crosswalk and thus avoid having these persons cross diagonally and not in the crosswalk with the subsequent dangers involved.

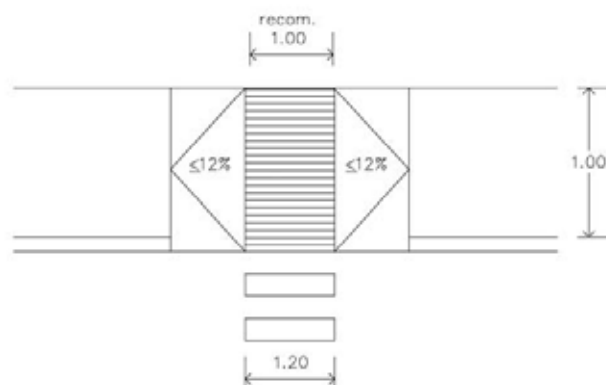
The minimum width of the crosswalk shall be 1.20 m but 1.80 m is recommended that allows simultaneous crossing of two wheelchair users next to each other. The curb of the access ramp shall be flush with the road. Gutters should be avoided because they make the curb ramps difficult for PRMs to use when they have stagnant water in them. In fact, in order to avoid having water stop in the center of the curb ramp, drains should be put on each side of the curb ramp. The openings for these drains must never be located in the same direction of the maximum flow of traffic and should be a maximum of 2 cm x 2 cm.

The guide strips for blind persons shall be located in the center of the curb ramp and perpendicular to it when there is an obstacle-free crossing in front of the curb ramp of at least 1.00 m. This guide strip shall take up the width of the sidewalk from the curb ramp to the facade so that blind persons can easily detect it.

The maximum longitudinal slope shall be 12% however 10% is recommended. When the curb ramps, due to the orography of the terrain, have a length-depth of over 3 m, the slope throughout the curb ramp shall be a maximum of 10%. However, 8% is recommended.

The maximum cross slope of all curb ramps shall be 2%. The pedestrian route they are located on shall have no greater than a 2% cross slope.

Figure 5 Curb ramp



Crosswalks

- The difference in level between the sidewalk and the road must be overcome using a curb ramp.
- Crosswalks shall be marked with white stripes whenever a traffic signal is not present and shall be marked with a horizontal intermittent line on each side when a traffic signal is present.
- There must be a central traffic island for all crosswalks that are longer than 12 m and require two signal phases to cross. If the volume of pedestrians is high, continuous crossing should be avoided and thus a buildup of crowds, having a traffic island that incorporates the two phase crosswalks (non-continuous). The paving of the traffic island should be different than the road and shall have a different texture and/or color than the materials used on its surroundings.
- For persons with serious visual disabilities, it is essential that the striping of the crosswalks be protected in such a way that the curb ramps are always perpendicular so that they cross in a straight line. Each crosswalk shall have two curb ramps, one across from the other. Sidewalk ramps shall not be permitted that take up the entire corner because this disorients persons with visual disabilities that usually cross perpendicular to the street.
- If the layout of the crosswalk is diagonal and cannot be modified, it would be a good idea to install stripes defining the boundaries of the crosswalk on both sides so that they can be felt or by creating an elevated crosswalk.

Stairs

The useful width of passage shall be a minimum 1.20 m. With this width, a company could install, if necessary, elevating mechanisms via guided stair lift platforms normally attached to the inside railing of the stairwell for PRMs that cannot use the stairs.

Steps:

- They must have a minimum tread of 28 cm and maximum riser of 17 cm. However, the recommended tread is 32 cm and riser 16 cm.
- The maximum number of steps in a row without an intermediate landing should be 12 per flight.
- Any differences in level equal to or less than three steps should be overcome by means of a ramp with a maximum 8% slope throughout.
- The nosing should be flush on steps where the tread meets the rise (bullnose). Non-slip material should be placed on the end of the tread of each step.

Landings:

- Angled landings, split landings and compensated stairs are not allowed.
- The intermediate landings of the staircase should have a minimum obstacle-free width of 1.20 m in the flow of traffic, but 1.50 m is recommended.

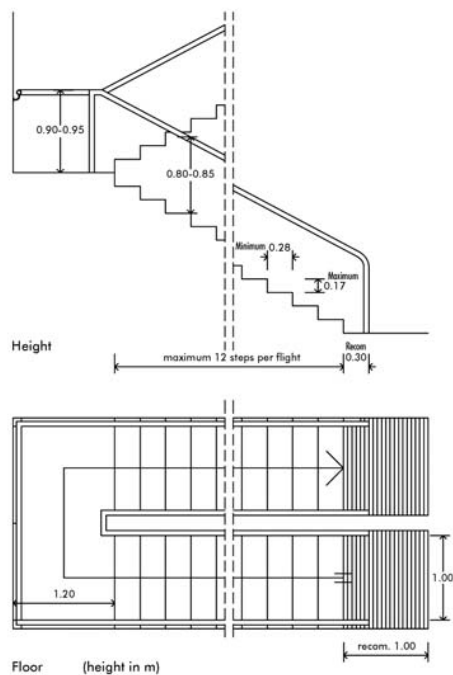
At the top and bottom of each flight of stairs tactile and color markings should be placed with a minimum depth of 1.00 m extending along the full width of the stairs and on each landing in order to assist in orienting persons with serious visual disabilities (we recommend that the stairs be one color and the landings another). The rise and the tread should be contrasted in order to be perceived by all.

Staircases should have **bannisters and handrails:**

- That can be used in both directions and on both sides of the stairs. An intermediate handrail should be placed in the middle as well if the staircase is wider than 5 m.
- Handrails should be placed at a height of 0.90 m to 0.95 m on landings and 0.80 m to 0.85 m on sections of stairs or ramps. A second handrail should be placed at 0.65 m to 0.75 m high in places frequented by children, smaller people, and wheelchair users on a regular basis in order to make it easy for them to grip it.
- It should have an anatomical design that adapts to the hand with a section that is equivalent to a round pipe 4 to 5 cm in diameter, separated at least 4 cm from the vertical parameters.
- Handrails must be solidly anchored. The anchors should be L-shaped in order to make sure their hand never leaves the safety of the handrail.
- Handrails must not be climbable if there is a stair opening.
- Handrails must extend a distance of 30 cm minimum at the top and bottom of each section of stairs. The handrail's point of inflection must coincide with the beginning of the section of stairs.
- Vertical and horizontal handrail protection: bar supports, cable tensors, etc. shall be separated by a maximum of 12 cm in order to avoid accidents with children that could slip between them.
- They shall be firmly installed and shall be free from any type of protruding or abrasive element.
- They shall not be made of metal when they are in the open air unless the temperature is guaranteed to rise very little even in the summertime.

If it is outside, the staircase must be **illuminated** at night at a minimum 30 lux so that the steps can be clearly identified and possible accidents can be avoided.

Figure 6 Stairs



Ramps

The surface of the ramps:

- Should be hard and without extra thickness that is different from the actual engraving of the pieces. You should also make sure that it is not slippery and to do so, it should have grooves to avoid slipping.
- You must anticipate the possibility of using wedges at the end of the ramp that eliminate the protrusion of the thickness of the material of the ramp so that it is flush with the surrounding surface or with the same thickness of the material originally installed.
- The surface surrounding the ramp must have a different texture and color so that it can be easily identified and used by everyone.

The useful width of passage should be 1.50 m which is sufficient to allow two wheelchair users to pass each other. The minimum width shall be 1.00 m.

The cross slope shall not exceed 2%.

The longitudinal slopes shall depend specifically on the length of the ramp and shall be:

- Sections up to 3 m long: Longitudinal slope between 8% and 10%.
- Sections from 3 to 6 m long: Longitudinal slope between 6% and 8%.
- Sections longer than 6 m: Maximum longitudinal slope of 6%.

Where two different **sections** with different slopes are joined, there should be intermediate landings that have a minimum length of 1.50 m in the direction of the flow of traffic. At the bottom and top of each section of the ramp there should be a landing that is a minimum 1.50 m long.

Whenever possible, it is recommended that the ramps be located in the same direction as the maximum flow of traffic.

Never place drains or grating in the same direction as the maximum flow of traffic so that accidents such as getting their wheels caught in them can be avoided.

The areas below the ramps should have an obstacle-free clearance of at least 2.20 m and must be protected in such a way as to avoid possible accidents.

They should have sufficient **lighting**, free from glare and shadowy areas, with a minimum ground level lighting intensity of 30 lux.

They must have lateral **longitudinal protective devices** on top of the ramp's surface when the ramp exceeds differences in level of more than 20 cm.

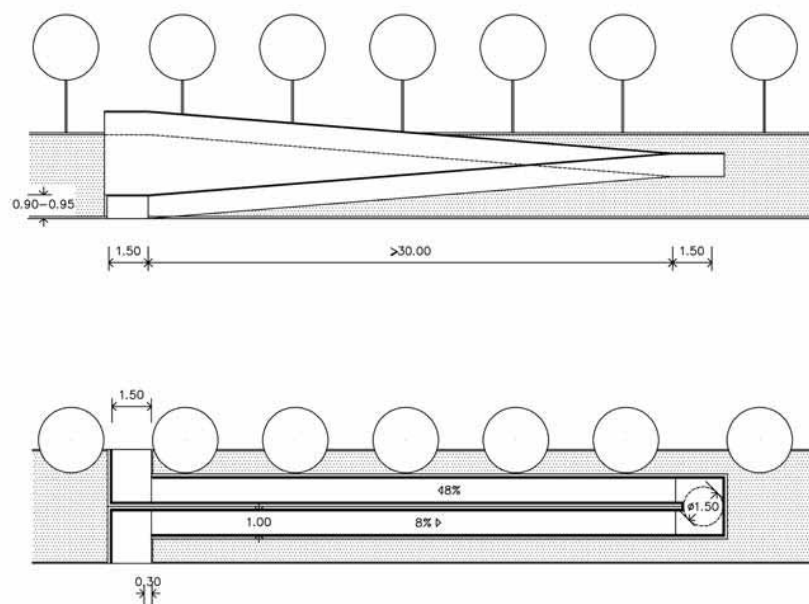
Stepped ramps **are not** allowed along accessible routes.

All ramps shall have **handrails** on both sides between 0.90 and 0.95 m high with the same characteristics as those specified in the chapter on stairs.

Handrails should also be a different color than the walls so that they are easy to distinguish.

Mechanical, mobile, or temporary ramps are appropriate for large differences in level. However, they pose a problem in that persons with reduced mobility need help in order to use them, depending on the longitudinal slope which is normally greater than 12%. That is why we recommend they only be used for very short sections in order to get over heights that are less than 30 cm.

Figure 7 Ramps



Street furniture

Accessibility characteristics:

Design: the supporting base cannot be narrower than the upper portion.

Street furniture should be aligned so as to always allow an obstacle-free passage of 1.00 m wide and 2.20 m high.

Street furniture on sidewalks must be located as closely as possible to the outside edge in a strip that is 50 cm wide.

All accessible street furniture must have rounded **corners** and thus cannot have edges or protruding elements.

Any element that protrudes more than 15 cm and that limits routes or pedestrian traffic must have a fixed, perimetral element on the ground (a type of baseboard) that is between 0 to 15 cm high so that it can be detected by the cane of a blind person or the item should be located at a height of 2.20 m or greater.

Any item of street furniture that must be accessible manually must be placed at a height of 0.70 m to 1.40 m.

All accessible benches and seats seating one, two or more persons must have armrests and a seat height of 43 to 45 cm. They must also have a seatback and the depth of the seat must be from 40 to 45 cm. Its perimeter must extend to the ground.

Sign mounts located at a height of less than 2.20 m on the pedestrian path of travel must be indicated down to the ground and for their entire perimeter. The mark shall be circular.

For signals, the push buttons that trigger the light change must be placed at a maximum height of 1.40 m. **Audible signals for blind persons** emit an acoustic signal indicating the time to cross when the user triggers it using a remote control.

Lighting poles and lampposts should be round and hanging from the facade of a building at a height of 2.20 m or higher along sidewalks that are less than 1.50 m wide or on the side of the curb. If they are slanted, they should not invade the obstacle-free pedestrian path of travel below 2.20 m high.

All trash containers must be designed in such a way that they are accessible by hand. The path of access to them must be an accessible pedestrian path of travel.

The housing of a **telephone booth** must have protected sides that go all the way to the ground from a height of 2.20 m. They can be used by everyone if they have a keypad and coin slot that is below 1.40 m high.

If they can only be approached from the front, there shall be an obstacle-free area below the telephone counter with the phone book of a minimum height of 0.70 m, minimum width of 0.80 m, and minimum depth of 0.60 m in order to allow access to wheelchair users.

Public telephones shall be permanently marked so that they are easily visible with the international accessibility symbol that is placed at a height of 2.10 m or greater if this signing protrudes from the perimeter of the public phone.

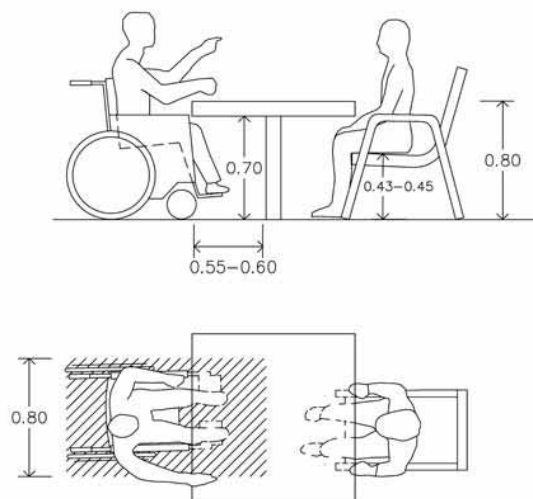


Mailboxes and **garbage bins** must have a perimeter that reaches to the ground and must have slots that are at an accessible height between 0.70 m and 1.40 m.

Delineators or **boundary markers** or items impeding the passage of vehicles on the sidewalk must allow free passage of 1.00 m between them and must have a minimum height of 1.00 m.

All accessible tables must be between 0.75 m and 0.80 m high and must have an obstacle-free area under the work area of a minimum height of 0.70 m. The obstacle-free width for a wheelchair user to be able to comfortably fit underneath must be 0.80 m and the depth must be 0.60 m.

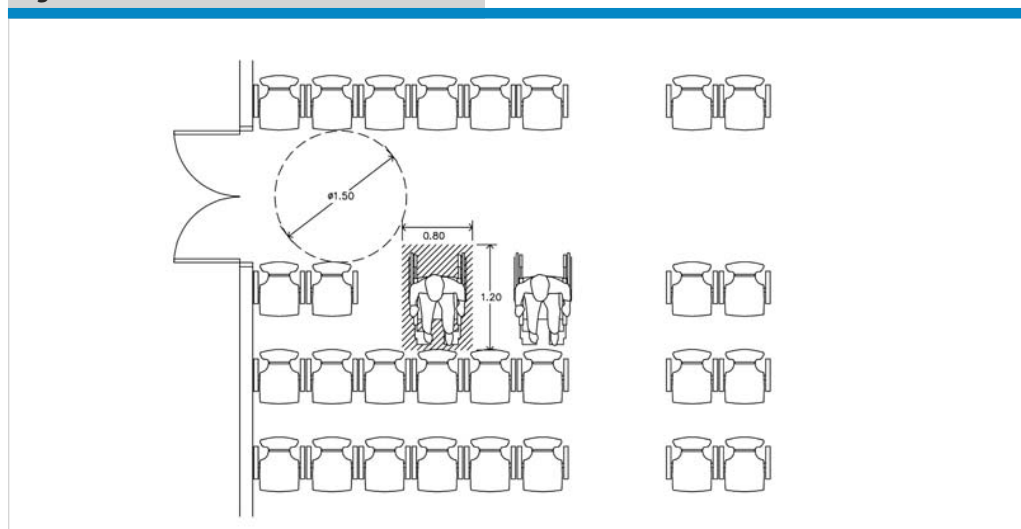
Figure 8 Tables



Stands and spectator areas.

- The seat of a spectator using a wheelchair must have the minimum dimensions of 0.80 m wide and 1.20 m deep.
- The access routes to these reserved areas, located in different locations if possible, must have a minimum obstacle-free width of 1.00 m and height of 2.20 m.
- Areas must be reserved next to these places for those individuals accompanying them with either folding, fixed, or mobile seats that are conveniently marked.
- Persons with sensory disabilities must be put in front-row seats in order for them to be able to hear the stage, show, etc.
- There must be handrails or banisters on the stairs in order to access the stands. We recommend that you install inverted U-shaped handrails (fork-shaped) next to the seats that provide obstacle-free access.
- If there is lighting, it must be located in the tread of each step or on the sides and not on the rise (in order to avoid glare). All stairs should be illuminated at a minimum 10 lux.

Figure 9 Lecture Hall and Auditorium Seats



All fountains and **drinking fountains** must have buttons that are easy to use. The spout must be at a height of between 0.80 m and 1.10 m. There should be no protrusions in the surrounding surface. The drain must have holes that are a maximum of 2 cm in diameter.

All vending machines must have a perimeter extending to the ground. The dials and coin slots must be located at a height between 0.90 m and 1.40 m. The instructions should be written in big letters, in a color that contrasts with the background, and can include a sound information device and Braille writing.

Accessible playground equipment must have an adapted internal route that reaches the center of the equipment, thus facilitating access to the rest of the adapted playground equipment. If there are access ramps that exceed a difference in level greater than 20 cm, they must have baseboards or banisters. The diameter of the handrails must be 3 to 4 cm so that it is adapted to children's hands.

The playground area must have a drained, stable, soft surface that is easily identifiable with your feet so that it alerts or informs persons with visual disabilities. This playground must be surrounded by a fence. The playground equipment must not be made out of metal, nor should it chip or peel. Its color should be contrasted to its surroundings. All of the playground equipment must have rounded edges. It is recommended to have benches for resting and for individuals accompanying the children.

Automated teller machines

It is important for ATMs to be of a different color from the walls that surround them so that everyone can detect them easily, especially persons with visual disabilities. They should be conveniently lighted day and night.

Path

The path to the ATM should be obstacle-free and have no stairs. The walking surface should be hard, smooth, and non-slip.

There shall be an obstacle-free area where a circle with a minimum 1.20 m diameter can be painted in front of the ATM. There shall be front access to the machine for wheelchair users and the keypad shall have 70 cm width below the workspace and 60 cm depth.

Its use

- The **slots** for inserting cards shall be located at a height of between 1.20 m and 1.40 m maximum.
- **Screen:**
 - Screens should be positioned as to avoid direct sunlight shining on them. The ATM interface should be illuminated at a recommended level of 200 lux.
 - It is important that the ATM have speech capabilities which means that the screen should be able to be locked in order to protect data.
- **Hearing:**
 - All operations must be accompanied by short spoken messages.
 - There must be an audible and visible mechanism that informs users when they forget to take their card or money.
 - The audio system must be able to transmit all of the visual information it provides except for advertising or confidential information.
- **Panel:** the screen and keypad are on the panel and they should be able to be seen from a minimum angle of 45°. The panel should have information in Braille and raised numbers/letters.
- **Functionality:**
 - In all types of situations all of the operational functions must be available in Braille and/or have raised letters/numbers (on the card reader slot, on the envelope dispenser, etc.).
 - In case of alarm, it is important for the warning button to be conveniently indicated and easy to use in order to facilitate its use by blind individuals or persons with visual disabilities.

- **Card readers and cash dispensers:** on one side they should have raised letters and lighting that makes them easy to locate and shall be shaped like a "funnel" so that cards can be easily inserted.
- **Card:** it shall have an indicator like a 2 mm deep lateral groove on the shortest side of the card. Likewise, the letters shall be raised and shall be a different color.
- **Bankbook:** it shall have the same measurements as the card.
- **Keypad:** it should have a raised mark on the number 5. The number keys and the function keys should be different. They keys must be a different color from their surroundings.
- **Screen:** touch screens are a problem for people with vision problems. It should have contrasting colors and you should be able to increase the size of the letters. Likewise, it should have a code to adapt it to the representation of characters and at the same time you should be able to turn the touch screen function off and use the keypad.
There should also be an option to increase the size of the content on the touch screen (bigger icons).
Pictographs should be use in order facilitate comprehension for all persons, including foreigners.
- **Voice functions:** the most common operations should be able to be performed by some audible system (telephone, headphones, etc).

Parking spaces reserved for handicapped individuals

For a person with reduced mobility or communication to access a business you must take into account some accessibility criteria that will primarily affect the parking spaces surrounding the business.

Adapted parking spaces for persons with reduced mobility must be reserved as close as possible to the accessible routes or pedestrian paths of travel. These parking spaces should be conveniently marked and must be a minimum 4.50 m x 3.30 m for 90 degree parking and have standard dimensions for parallel parking spaces.

We recommend that you paint the pavement and perimeter of these parking spaces with a color that contrasts the rest which is generally white.

It is essential that **90 degree parking spaces** have an obstacle-free access route of at least 1.50 m wide next to the vehicle so that it is easy for wheelchair users or persons who have trouble walking to get in and out of their vehicle. This route should have an access ramp to access the sidewalk and connect to an accessible pedestrian path of travel. You must avoid having the front and rear end of parked vehicles partially infringe upon pedestrian paths of travel.

It is prohibited to park vehicles (bicycles, mopeds, motorcycles, etc.) on the sidewalk next to reserved accessible **parallel parking spaces**. Neither can any item and/or street furniture be placed next to them that impedes side entry/exit of persons with reduced mobility, serious limitations, and wheelchair users.

Signing for these parking spaces must include the international accessibility symbol on the pavement as well as a vertical sign that is located in a place that is visible from inside the vehicle which prohibits parking. This sign must have a wheelchair symbol on it in order to inform others that the parking spot is reserved for people with reduced mobility that have more than a 33% physical or visual disability. If the sign is vertical and invades an accessible pedestrian path of travel below a height of 2.10 m, it must then be placed on a wall or an adjacent landscaped area or its perimeter must be extended all the way to the ground with rounded edges in order to avoid having people with visual limitations and/or people not paying attention bump into it.



Characteristics of parking spaces reserved for PRMs:

- The minimum dimensions for the vehicle must be 3.30 m wide x 4.50 m long for 90 degree parking and 2.20 m wide x 4.50 m long for parallel parking.
- There must be sufficient space to approach the driver's side and passenger's side doors depending on who the PRM is. This area could be shared with another adapted parking space. It should allow a turning radius of 1.50 m if the route it is connected to is adapted and 1.20 m if the route is passable.
- Reserved accessible parking spaces and the access route to them need to have an access ramp between the sidewalk and the road that has a maximum longitudinal slope of 12% and a minimum width of 1.20 m.
- They shall also be marked with the accessibility symbol on the ground and vertical signs saying "No parking" should be placed at each end of parking spaces reserved for PRMs.
- You should paint the parking space and/or curb, depending on the case, in a bright color that is different from the rest of the parking spaces (yellow/white or blue/white).
- We suggest that the spaces be covered with a light structure that protects them from the elements. There are persons with seriously reduced mobility that need time to get in and out of their vehicle.
- It is also important for the lighting to be correct if it is an underground parking space or if it is a space on the street or in the open that is used at night.

- Have a small playground with playground equipment that is safe, spacious, fun, and made of strong materials (rubber blacktop, etc).
- Protect the tree grates so that they are not a risk to the visually impaired.
- Cover drains with grates that are small enough so that nobody trips over them or high heels and canes don't get caught in them.
- Make sure to trim the trees so that they do not obstruct paths of travel and so that people do not bump into their branches if they are below 2.20 m high.

Parks

- Parks should be structured in such a way that they have an organized spatial distribution and the main axes should be well defined (it is also possible to include guide strips on the ground in order to inform and orient blind individuals as well as everyone else). All entrances should be easy to locate.
- Tree branches should never invade the path of travel and should always respect the minimum obstacle-free height of 2.20 m.
- All flowerbeds and planters should be marked with continuous elements around them.
- All furniture that is not to be used or handled by users (street lamps, junction boxes, etc) should be located in the flowerbeds or landscaped areas.
- All furniture should be located outside of the path of travel, should not have edges, and should have a color that contrasts with its surroundings.

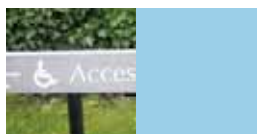


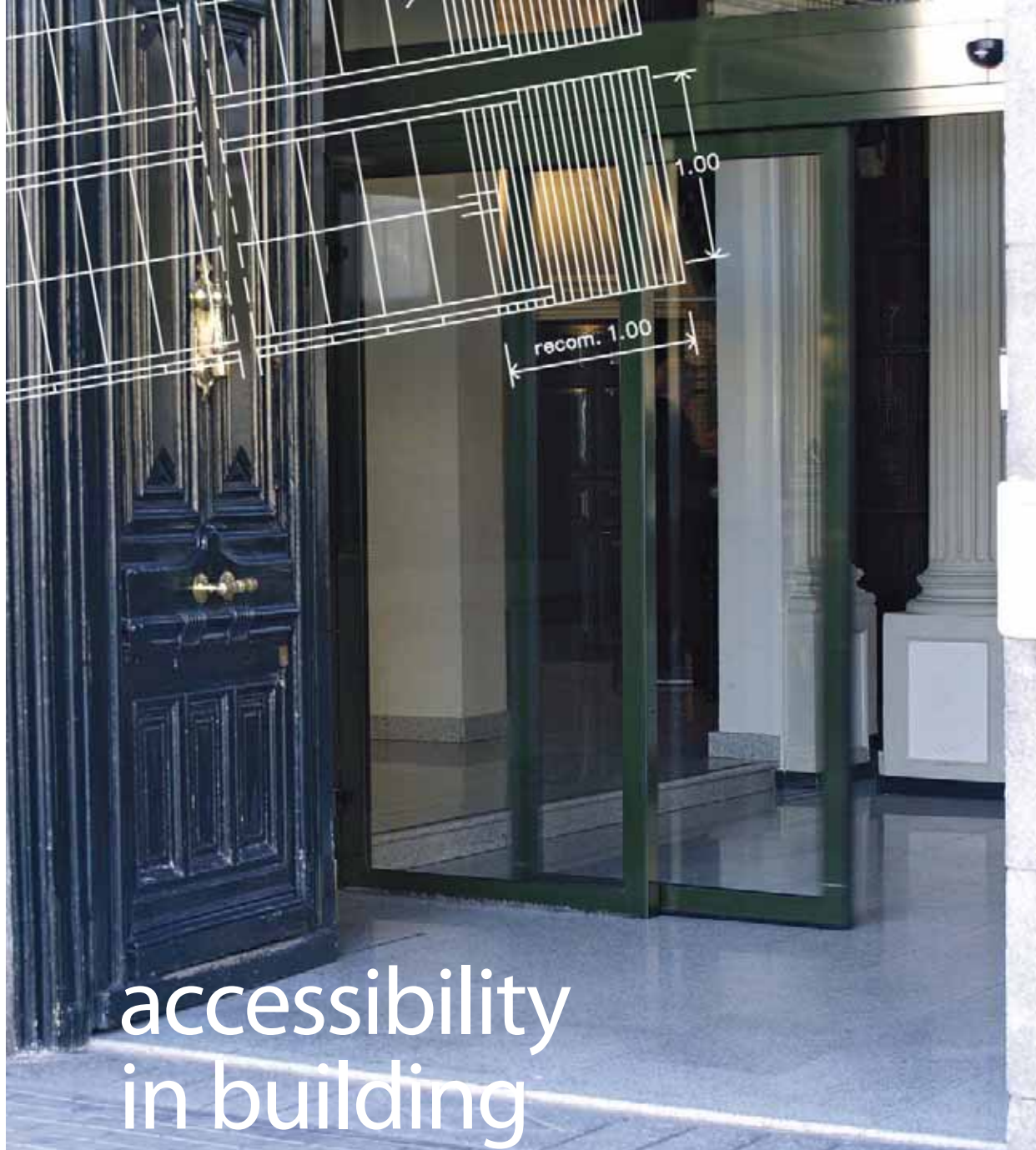
- Protective items, anchoring devices, cables, or tripods that are placed to protect and/or support trees must also adhere to accessibility requirements and allow a minimum obstacle-free passage of 1.00 m wide and 2.20 m high. The portion of the cable located closest to the ground must be covered by a rigid tube that is easily detectable (whenever possible, anchoring devices should be buried).
- Landscaping that emphasizes texture, color, aroma, and noise could be very beneficial for all users in general. However, including aromatic trees or plants with fragrant flowers also helps the visually impaired orient themselves by smell in each area that has a different fragrance and characteristic.
- Also fountains and waterfalls, the friction of leaves or sound of animals facilitate orienting oneself by hearing and could signal intersections or main directions.
- All signs should be written in raised letters and/or in Braille.
- There should be tactile models at the entrances that specify the possible accessible routes and they should be made from materials that do not heat up when exposed to the sun on a regular basis.
- Gravel surfaces are not recommended except when they have been compacted. Symbolic places can be marked on the ground with a change in material, texture, and/or color that is different from the surrounding area.

Landscaped areas

When conveniently marked, they serve as a walking guide for blind persons who use a cane.

Ideally, the perimeter of these landscaped areas should be illuminated at night at a minimum 10 lux.





Scope of application

Bringing accessibility into a project or building that has already been built that is the main office of a business does not consist in applying a set of corrective measures to a proposal that has been drawn up, altering or modifying it occasionally, but rather incorporating a new variable upon which things are based that influences the final solution from the outset, accepting the diversity of the building's end users: persons with all of their capabilities or those who are temporarily or permanently disabled such as those with difficulties getting around, elderly persons, persons with strollers, persons carrying packages, persons who use canes, heavyset persons, short persons, wheelchair users and/or persons with sensory disabilities such as vision and/or hearing, and persons with orientation difficulties (currently 30% of the population).

Fortunately, there are practically no incompatibilities between the needs of all of them which makes **"Design for everyone"** more and more a reality that society demands.

The accessibility needs in building depend on the building's use, size of the company measured according to its surface area, its capacity, and/or if the building is a building of artistic or historical heritage.

Public and/or privately owned buildings for public use

There are two basic types of establishments: those that are open to the general public such as cultural, sports, commercial, and administrative buildings and specific buildings for sanitary, healthcare, housing, educational, religious, and sports groups.

In all of these buildings we must take into account the improvement of accessibility and elimination of existing architectural and communication barriers, but always depending on the use and design of the building or premises, the conditions of the users, the use made of it at all times, and pre-existing constructions when working on a new building, changing the use of it, renovating it, restoring it, or expanding it.

Considering the accessibility of a pool for all groups guarantees that persons with motor disabilities can benefit from practicing a sport that is highly beneficial to their rehabilitation and physical fitness. You should also think about unlimited, comprehensive accessibilities in areas of public use at offices which takes into account employees with disabilities. However, in buildings with historical and artistic value, said value shall have to be respected and there may be areas that are not accessible or technical aids may have to be used in those areas in order to complement the architecture and resolve any accessibilities challenges. Likewise, accessibility in evacuation plans and building safety must be taken into account as well.

Buildings for private use

Accessibility shall be applied to new building projects, renovations, remodeling of areas, and restoration depending on their height, use, and capacity.

The tasks to be carried out will be much simpler for one-story or ground floor buildings for private use than for multi-family buildings where an elevator must be installed or the area of where it will be installed in the future is allotted. The tasks will be more extensive in buildings where it is already required to install an elevator.

If you are working on housing adapted for PRMs, the situations will be more demanding depending on the degree of disability and independence the disabled persons have. The space needed for a wheelchair user to maneuver is not the same as the orientation needs of a visually impaired individual who can walk perfectly fine but does so slowly.

When it comes to buildings for known end users with specific needs, you must pay careful attention to the design of each and every item. The main details are: a public restroom that is used intermittently is not the same as a bathroom in a geriatric home where everything needs to be optimized taking into account users and caregivers alike. But if you master accessibility measurements, you can, for example, eliminate the bathtub and convert it into a shower, adjusting the layout of the various bathroom elements and allowing sufficient lateral space for

those that need to enter laterally, including installing double doors to facilitate entering and exiting for wheelchair users from a corridor that is not very wide. All of this can be done without widening the perimeter of the restroom.

But to get to this point, you must constantly master the accessibility parameters in all of the details of the project because just 2 cm could impede wheelchair users from getting through a door, or getting under a table, or reaching a plug, or using a ramp because the slope is too steep; or even blind and/or deaf persons may not be more independent because they don't have proper information and/or visual and audio signing in the areas, along paths of travel or with the elements they use. You must always keep in mind that these actions will provide users with even more information and allow them to get around safer and more comfortably.

Accessibility is a quality that is built into the project. The best accessibility is that which is not even noticed, but is within reach of everyone, which is, standardized design. Specific solutions shall only be applied as a last resort in order to remove existing architectural and/or communication barriers.



Outdoor routes and access to entrances

It is recommended that all entrances to buildings be at street level. However, at times this is not possible due to many factors. In these cases you must plan for alternatives that enable all persons to enter the establishment. This entails combining the use of a ramp that provides access to persons that cannot get up steps or who are wheelchair bound, and a staircase that may be more comfortable for others who have trouble using a ramp.

No matter what the entrance is like, if it cannot be the same as the main entrance that the rest of the customers and employees use, it should be a good, accessible entrance. It should be an entrance that is the same quality of entrance and that doesn't lead to a customer or employee feeling like they are being treated inadequately. For example, accessing a building using the parking lot ramp or via a loading dock would be discriminating against the recipient of a service you are trying to provide.

Good intentions are also not sufficient. The good intentioned alternative of carrying someone up the stairs in your arms is not an adequate solution due to the lack of safety and risk of falling and because any accessibility solution adopted must not hurt the person's image.

In every case it is important to have an alternative entrance to the main entrance that is properly marked at the main entrance and that is as close as possible because distances are also a barrier for PRMs.

Access can be gained by using a gradual ramp that is next to the stairs or via an entrance that is on another side of the building that provides access to the ground floor. Even an elevator or vertical or inclined elevating platform could be used.

Indoor routes

Once inside the company, for a person with a visual disability that is not familiar with the premises to orient himself, it would be advantageous to place different texture and color guide strips on the floor that indicate the path to follow and enable the person to distinguish when they have gone from one place to another. It would also be a good idea for the ground to be hard, smooth, and non-slip and for the signing of the different services, rooms, etc. to be clear, correct, and contrasted in color with the rest of the elements.

Reception and information desks

The space and furniture used for attending to customers should adhere to certain characteristics in order to be accessible to all.

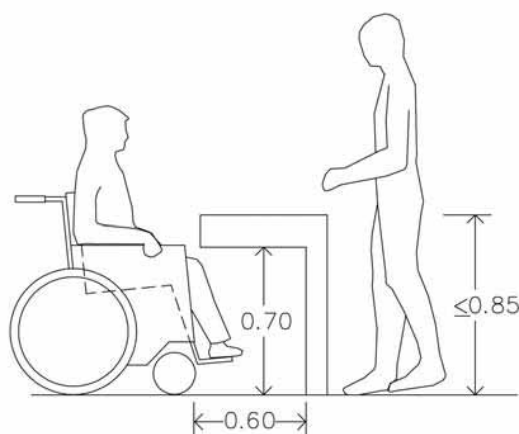
All counters or **windows** should have the following features in order to guarantee accessibility:

- The customer service area should be clearly marked so that anybody can locate it easily.
- It should be made of two parts, one that is between 75 cm to 85 cm off the floor and another that is between 1.05 m and 1.10 m off the floor.
- If they can only be approached from the front, there shall be an obstacle-free area below the counter of a minimum height of 70 cm, minimum width of 80 cm, and minimum depth of 60 cm in order to allow access to wheelchair users.
- The counters and windows must be solid and stable so that a person using crutches can lean against it and balance themselves in order to free their hands to be able to fill out a form, pay for a ticket, grab a flight schedule, etc.
- The counters can include a shelf that allows elderly persons to lean on it or place their cane, purse, or any other object on it that interferes with them using their hands.
- Frequently information booths have a glass window that separates the customer service representative from the customer which in turn requires the booth being equipped with an amplification system to facilitate communication with customers with hearing disabilities. (It is possible to install

magnetic loops that amplify the sound for persons with hearing aids in the "T" position).

- The information provided on the counters or that is given at a window must be printed in big letters for persons with visual impairments.
- Displays or shelves with information available to the public must be located at a height that enables all persons to see what they contain and reach whatever they may need. You must think about those who have difficulty reaching: wheelchair users, short persons. (Ideally, the display would be at a height of 1.20 m).
- Signs and ceiling placards shall have raised letters and/or Braille letters that are contrasted in color with the background;
- Also, audio guides with an audio description should be available for persons with visual impairments and blind persons and sign guides to describe the content of the product display of each company for deaf persons as well.

Figure 11 Customer service counter



Horizontal communication elements

The hallways, meeting rooms, and rooms of any establishment that are open to public access must take into account a series of details that contribute to their accessibility.

Floors

Hard, smooth, non-slip flooring shall be used that does not produce glare or cause slipping. You must also make sure that any products used to buff or polish the floor do not make it slippery.

If you have rugs or carpets that are not fastened to the ground or that have long fibers, they must be firmly fastened to the floor and the surface of them must be as strong as possible depending on how they are used. They must be made of strong fabric with few fibers because those with fibers cause wheelchair users, persons pushing strollers or shopping carts to have to exert themselves in order to get across the carpet, constantly having to correct their direction.



Small differences in level

Small differences in level should be overcome by using gradual ramps that have a maximum longitudinal slope of 10% that takes up the entire width of the path of travel. The ramp section should be a maximum of 3 m long.

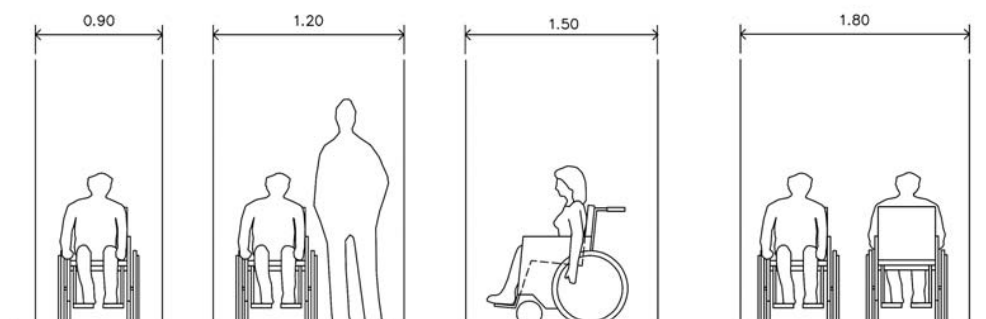
Corridors and hallways

- The minimum width of traffic areas should be 1.80 m (exceptionally 1.50 m wide). The minimum width of passage for the door should be 80 cm (± 2 cm).
- All obstacles or occasional elements that reduce the width of the corridor by more than 15 cm must have warning markers placed around them that enable them to be detected by the cane of a blind person and they should be able to get around them by using a handrail.
- If all of the floors of a building have the same structure and layout, it will facilitate orientation for all blind persons, users, and visitors. Each floor should have a sign indicating what floor it is. The sign should be located in the same place on each floor and be easily accessible from the usual paths of travel (in front of the stairs and next to the elevator). The signs should be made of a color that contrasts with the wall and they must have raised numbers or letters and Braille.
- Light switches must be a color that stands out from the wall and be an illuminated type light switch that makes them easy to find in the dark.
- Artificial lighting by means of ceiling lighting or lights on the wall at the same height will enable persons with visual disabilities to get around easier.
- The guide strips on the ground should be a minimum 30 cm wide and be made of a material and/or color that is different from the surrounding flooring. They help persons with serious visual disabilities to orient themselves. We recommend that the guide strips be located in the main corridors of the building. They could be completed by having baseboards on the walls, "borders" or similar items, making sure that no object invades the path of travel below a height of 2.20 m.
- You must install handrails in the corridors to help persons with walking difficulties balance themselves. Their color should be contrasted to the adjacent walls. They can include information items with raised letters and Braille.

All traffic areas should have the following minimum widths:

- 0.90 m: allows one wheelchair user to get by.
- 1.20 m: allows a wheelchair user and an ambulatory person to get by. This width allows wheelchair users to turn around but with a fair degree of difficulty.
- 1.50 m: allows an ample, comfortable passage for a wheelchair user and an ambulatory person. This width allows wheelchair users to turn around comfortably.
- 1.80 m: this width allows all of the aforementioned features with a great degree of comfort. This dimension is the one we recommend for all corridors as a minimum which will even enable cross traffic of two wheelchair users.

Figure 12 Traffic areas



In addition to the aforementioned, you must take into account a series of basic conditions for all accessible routes:

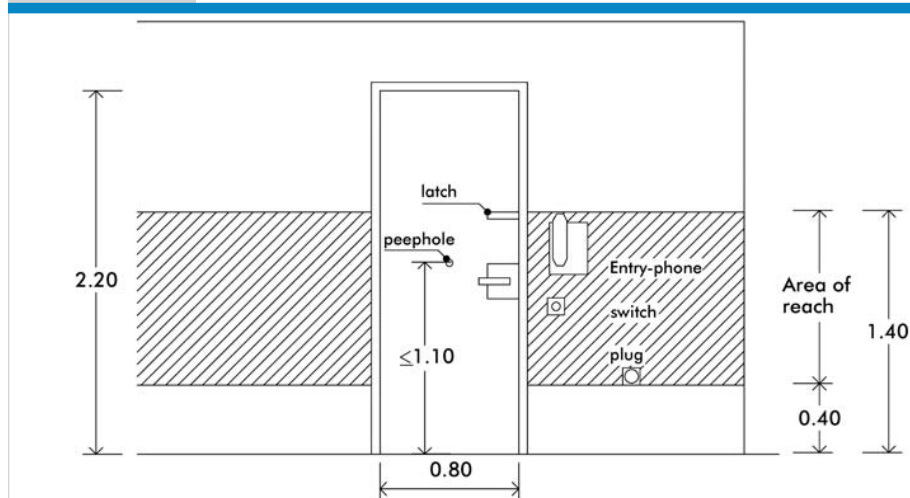
- They must have a minimum width of 1.20 m in order to allow cross traffic between a wheelchair user and an ambulatory person.
- If they are long corridors, there must be a chair or bench placed ever 20 m because obese persons, elderly persons, and people who have trouble walking have little strength to walk long distances.
- You should avoid having decorations or unnecessary objects that could be an obstacle. It is not only a question of gaining space but also avoiding having people with visual impairments, persons who are not paying attention, and children who are playing bump into those objects.
- The doors of the corridors should open towards the inside of lounges or rooms in order to avoid hitting persons passing by.
- Lighting should be done in such a way as to fully take advantage of the maximum amount of natural light, even inside. There should be no abrupt changes in lighting from one area to another in order to avoid glare. The lighting should be indirect or direct with diffusing panels and reflectors that concentrate the beam so that it doesn't produce glare. Lighting should be uniform and at an average intensity of 200 lux on the ground.

Doors

All doors must fulfill a series of requirements in order to be accessible which are described below:

- Width: 80 cm ($\pm$ 2 cm).
- The opening angle of the door shall not be less than 90° even if doorstops are used.
- The color of all doors and their door frames should be contrasted with the surrounding wall in order to make them easily perceptible to persons with visual disabilities.
- They should not be heavy because that would require a great amount of physical effort to open them.
- All doorknobs and handles should be on both sides of the door, inside and out, and should have an ergonomic design that is easy to operate and grasp for persons with hands that are not very agile (lever-type handles, push plates, etc.). They should never be operated by having to turn your hand. Round door knobs should be especially prohibited.

Figure 13 Door



Revolving doors

Traditional revolving doors are uncomfortable because someone who does not feel very sure about themselves may trip while going through them, especially if they are carrying suitcases and wheelchair users generally don't fit. However, there are accessible revolving doors on the market that stop when a person stops and that have sufficient space between the separations for wheelchairs. This is an interesting solution for establishments such as hotels.

Glass doors

These doors are usually made with safety glass and have a 30 cm high kickplate to protect against bumps and scrapes. For visual purposes, place a horizontal strip that is a minimum 5 cm wide at a height of 1.50 m that is contrasting in color. We recommend that you use two identical strips at two different heights, 1.70 m and 1.30 m high respectively.

You could also treat the lower and upper portions of the glass with translucent and/or transparent material which would produce a clear contrast between them.

Automatic doors

These doors are more comfortable for PRMs because they open when the person gets near or when they push a button. They must be equipped with systems that keep them from closing in the event that a person gets accidentally trapped inside (electric switch, infrared beams, radar, etc).

The sensors must cover a certain height and width depending on the users: persons that walk with a cane or use a wheelchair to get around, etc.

Landing doors that open inward or outward

If they are located at the end of a ramp and open outward, you must remember to allow sufficient space for a person in a wheelchair to maneuver and open them without difficulty.

Vertical communication elements

Ramps

Longitudinal slopes of ramps are classified according to the length of the path of travel and distance that person who walks slowly or uses a wheelchair must travel.

Please refer to that which was stipulated on page 24 regarding slopes and ramps in urban accessibility and the data in the figures below:

Figure 14 Cross slope ramps

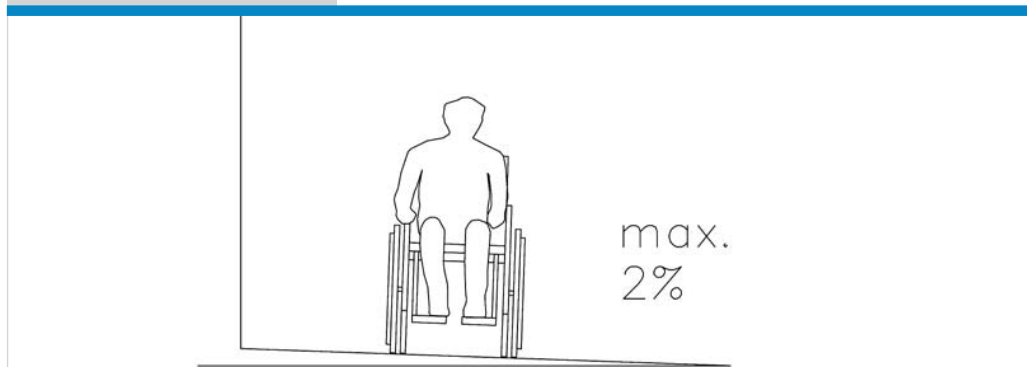
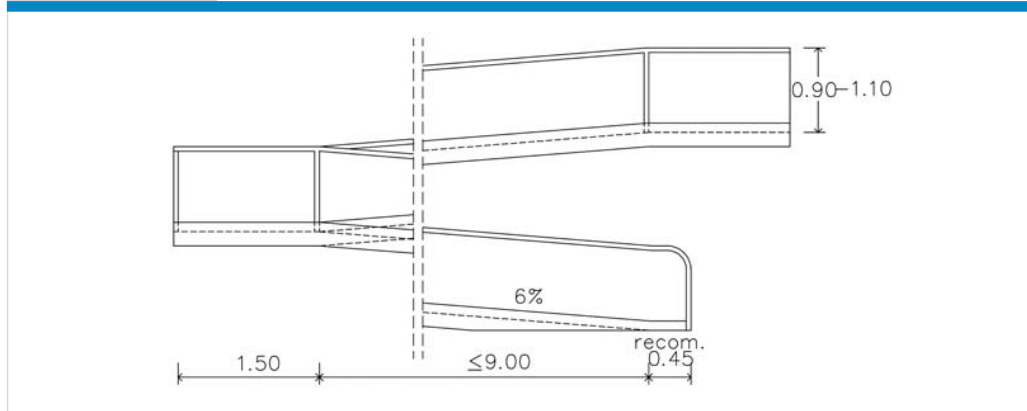


Figure 15 Ramps



Stairs

Access using stairs shall be subject to the aforementioned requirements regarding urban accessibility and keeping in mind that the minimum width shall be 1.00 m in buildings for private use and 1.20 m minimum in buildings for public use. The intermediate landings of the staircase should have a minimum obstacle-free width of 1.20 m in the flow of traffic, but 1.50 m is recommended.

Elevators/elevating platforms

Calling: There shall be an obstacle-free area where a circle with a minimum 1.20 m diameter can be painted in front of the doors of an elevator which enables all users to maneuver easily, including wheelchair users. (1.50 m is recommended).

The call button outside of the elevator shall be located at a maximum height of 1.40 m but a height of 1.00 m is recommended so that all users can access it.

It shall be raised and/or have Braille so that it can be read by persons with visual disabilities. Ideally, it should be lit up when it is pressed and its color should contrast with the text and surrounding background.

Entering: on routes that are adapted or passable for PRMs (persons with reduced mobility) and/or persons with sensory disabilities, the width of useful passage of the standard automatic doors in the elevator car shall be 0.80 m (± 2 cm). The opening mechanism shall be equipped with a sensor on the automatic door and shall also have a hold mechanism using sensors at different heights that warn that the closing of the doors has been interrupted by a person.

Ideally the doors would be equipped with slowed automatic closing mechanisms (photoelectric devices or the like) in order to improve access for persons with seriously reduced mobility and/or wheelchair users. Doors that are not equipped with these mechanisms constantly close on them and their wheelchairs when getting in and out of the elevator in a slow fashion and this can cause accidents.

Being inside: The inside of the elevator shall be characterized by:

- Having the following minimum dimensions:
 - Adapted: 1.10 m wide by 1.40 m deep in the direction it is accessed. (public use).
 - Passable: 0.90 m wide by 1.20 m deep in the direction it is accessed, having a surface area of 1.20 m² or greater. (private use).
- The handrails should be located at a height between 0.90 m and 0.95 m on all three sides of the elevator car excluding the doors. They should have an anatomical design that adapts to the hand with a section that is equivalent to a round pipe 4 to 5 cm in diameter, separated at least 4 cm from the vertical parameters.
- A baseboard or protective bar should be placed around the perimeter at a height of 30 cm especially if the vertical walls of the elevator car are made of glass, thus avoiding any bumps or scrapes.
- The floor should be non-slip. No carpets or the like shall be permitted if they are not fastened to the floor of the elevator car.
- If a mirror is installed inside, the bottom edge of the mirror must be placed at a maximum height of 0.90 m so that people who are short and/or are sitting down can see themselves in it.



Going up or going down: The buttons must be placed between 0.90 m and 1.40 m high from the ground. They should be minimum 20 cm from the corners of the car so that wheelchair users can freely push the buttons.

The alarm and stop button should be located at the bottom of the panel so that all users can reach them and their size and color should be different from the rest to make them easy to identify.

All of the buttons should be raised buttons and have Braille next to them. The layout of the buttons should be in the normal order (it is not a good idea to place the buttons in a disorderly fashion).

The audio messages should be able to be heard inside and outside the elevator car in a clear, loud tone.

We recommend that you put an indicator or screen in the elevator above the buttons and at the height of the occupants, indicating the floor the elevator stops at.

Exiting: next to the elevator door and on each floor it stops at there should be a panel with a raised number identifying the floor. Its minimum dimensions shall be 10 cm x 10 cm and it shall be at a maximum height of 1.40 m from the floor which will enable all users to orient themselves. It will also help persons with visual disabilities because they will perceive which floor they are on from inside the elevator via touch and/or the contrasted colors between the figure and the background of the panel. We recommend that the panel be located on the wall across from the elevator and on the wall just to the side of the entrance to it so that it can be easily seen from inside the elevator and from the waiting area on each floor. We recommend that you put a “you are here” schematic next to the elevator door that has raised letters and Braille. It should be at an average height of 1.20 m.

Finally, an alternative to the elevator in order to go up one or two stories, if moderately used, can be a vertical or inclined elevating platform. There are many models on the market. They don't need a cable trench or an engine room. They only need to be plugged in and have a key and button that needs to be pushed continuously in order to operate them.

In case of emergency there are accessible elevators in zoned areas of the building.

Breakdowns and resolving problems

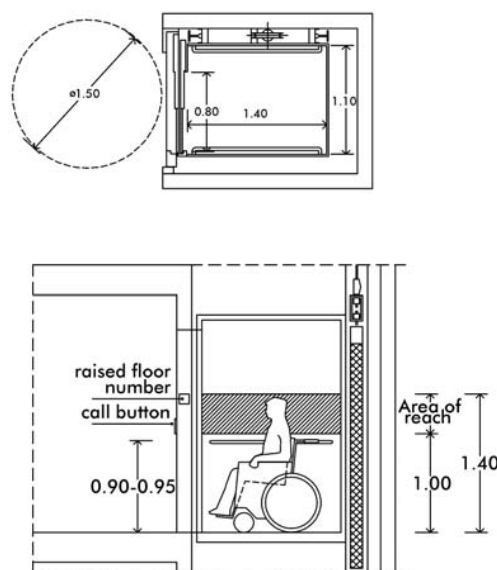
You must take into account that in the event the elevator breaks down and a **deaf** person is trapped inside, they can be totally isolated from the outside world if the elevator is equipped exclusively with an intercom system as most are.

In case of emergency, glass elevators allow deaf persons to communicate visually with the outside world. It is a good idea to anticipate the possibility of communicating via SMS (written message) in lieu of the intercom system.

If the doors are opaque, the following measures must be adopted:

- A video intercom system with a red light and alarm for communicating in sign language or reading lips (need for first aid, fainting, or claustrophobia).
- All information should be provided in written form on the screen as well.
- Possibly having a switch that, when activated or pushed by the user, a flashing or twinkling light appears with a message written below the switch that says "when this light is activated, maintenance personnel has received the message of an incident".

Figure 16 Adapted Elevator Car



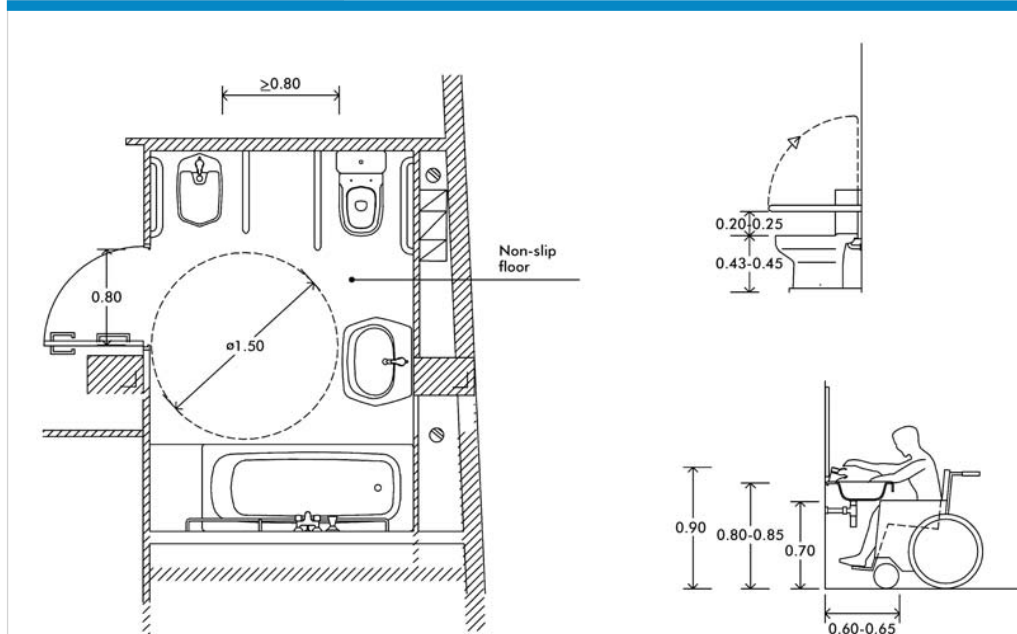
Restrooms

Dimensions and layout of different restroom devices

- There shall be an obstacle-free area where a circle with a minimum 1.50 m diameter can be painted in front of and behind the door to these restrooms which will allow wheelchair users (PRMs) to comfortable maneuver and access them. For unique or cultural heritage jobs, the diameter could be 1.20 m if it means modifying the walls or affects the viability of the solution.
- On the inside of the door you should put a handle in the middle of the door at a height of 0.90 m which will enable a PRM to easily close the door from inside the stall.
- The latch or locking mechanism shall be ergonomically designed with a bolt or push button locking system (never one that requires turning their wrist). The door shall be able to be opened from the outside in the event of an accident or emergency in the toilet stall so that the person involved can be rescued without having to break down the door. It should have occupancy colors (green/red) that indicate whether it is vacant or occupied respectively.

- At least one urinal per restroom shall be 30 cm tall and have lower free space of a maximum or equal to 22 cm so that short persons and children may use it. The rest of the urinals shall be 50 cm tall and have large dimensions.
- The toilets shall be 43 cm high with the toilet seat cover at 45 cm high maximum and shall be equipped with a low tank in order to assist with the balance of its users.
- All toilets shall have an obstacle-free area on at least one side of 0.70 to 0.80 m so that a wheelchair user can transfer from his chair to the toilet.
- The assistance rails for getting from the wheelchair to the toilet should be at a recommended height of 70 cm – 75 cm and should be spaced apart 70 cm – 75 cm and centered with respect to the toilet.
- There should be a big mirror whose lower edge should be 0.90 m off the ground. All of the mechanisms and complementary devices should be placed at a maximum 1.40 m high and should contrast in color to the adjacent walls.
- The sink should be 80 cm – 85 cm high and should have an obstacle-free useful space below it of 70 cm – 68 cm. The faucet shall have a single handle, push button, or cross shaped knob (never round) and shall be a maximum 0.60 m from the edge of the countertop.
- The sink should be placed as close to the edge of the countertop as possible so that PRMs with serious disabilities can use it more comfortably.

Figure 17 Accessible restroom



Changing rooms

In sanitary facilities you must apply the accessibility requirements that were stipulated in the section above on restrooms.

The traffic areas inside must have a minimum width of 1.00 m and turn around areas must allow a turning radius of 1.50 m diameter (without being infringed upon by the opening of the door).

Each dressing room for men, women, and instructors must have a small, adapted bathroom and shower.

In changing rooms and fitting rooms there must be at least one booth for each sex. The dimensions of each booth must allow a turning radius of 1.50 m diameter without being infringed upon by the opening of a door. If the **door** opens outward, it must have a handle in the center at a height of 0.90 m to 1.00 m to pull it shut. The lock must be ergonomically designed (that does not require moving the wrist to operate it) and should be able to be opened from the outside in case of an emergency. The door handles must be operated by pressing on them or using a lever.

All instructors' changing rooms must also be accessible. We recommend that a vertically folding changing table be installed inside at a height of 43-45 cm (ideally the height should be adjustable to be able to change a baby or dependent child with a severe disability).

It is also recommended that you have adapted stalls with a sink, toilet, shower, and bench that is 43-45 cm high.

The frontal approach area to lockers, benches, showers and other furniture must be obstacle-free with a minimum width of 80 cm and length of 1.20 m.

The area of **adapted showers** shall be as follows:

- It should be a minimum 0.80 m wide and 1.20 m deep and there should be a lateral approach.
- The base of the shower must be flush with the surrounding floor and must have a folding seat that is attached to the wall on the short side of the space that is placed at a height of 43 cm to 45 cm and a minimum lateral surface area of 0.40 m x 0.40 m. We recommend having shower seats with folding legs and vertically folding support rails, two support rails for transfers from a wheelchair that are located at a height of 0.70 m-0.75 m which should be centered with respect to the seat and should be separated by 0.70 m to 0.75 m.
- The rail on the side of the lateral approach area must be vertically hung.
- The taps should be within reach (1.00 m-1.20 m high) from the shower seat and they should either be push button or lever operated. The shower should be equipped with a handheld showerhead. If, however, it is a fixed showerhead, the waterflow must be regulated so that it falls directly over the shower seat. A horizontal grab bar should be placed below the shower knobs at a height of 0.90 to 0.95 m.

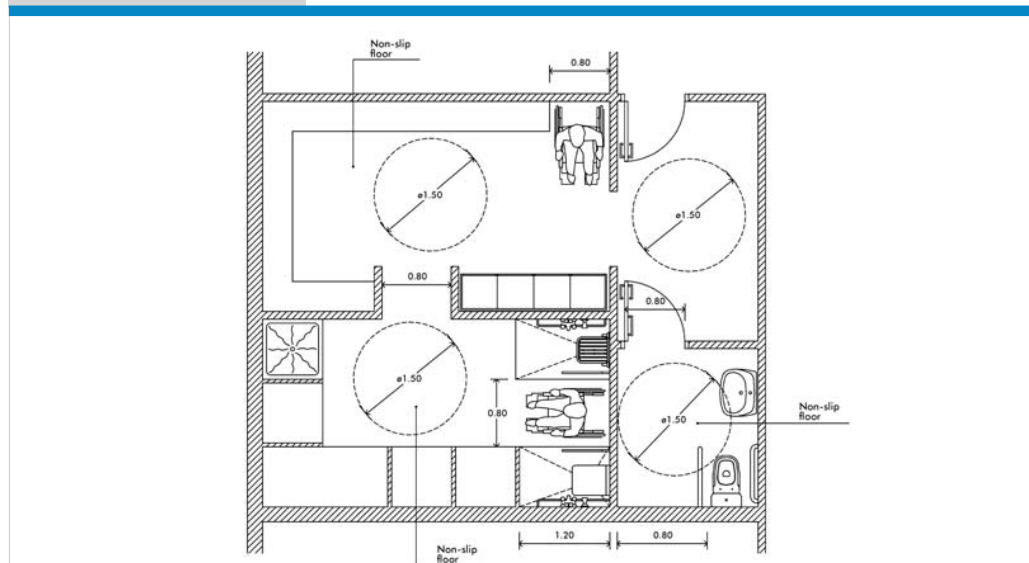
The shower seat can be complemented or substituted by a plastic wheelchair (that is owned by the company) that can get wet which will facilitate access to the showers for persons with seriously reduced mobility and will also provide access to various public use water facilities (pools, spas, saunas, etc).

All coathangers and other accessories and items that are used by hand must be placed between 0.40 m to 1.40 m high.

The floor should be non-slip. The shower must have a maximum slope of 2% for water drainage.

All signing must have tactile letters with raised letters and symbols and Braille.

Figure 18 Changing room



Furniture and display elements

All waiting rooms, lounges, lobbies, etc. of an establishment should also take accessibility into account. Simple design, harmonized colors, pleasant lighting, moderate noise, lack of excessive furniture and decorations that hinder traffic would be things to take into account in order to make these places comfortable and practical for the use they were designed for.

The main features these areas must have in order to be accessible are:

- They must have furniture that facilitates wheelchair traffic throughout the different areas of the room. Passage widths of 1.00 m.
- Too soft of armchairs or couches are not recommended because it makes it too difficult for a person who is obese, elderly, pregnant, or not very agile to get up. They should also not be too short for the same reasons. They should also have an ergonomic design: proper height 43-45 cm with a seat-back and armrests to properly support oneself and not suffer from subsequent back pain.
- In addition to being comfortable, the seats should have a safe design so that it doesn't tip over when someone leans on the seatback or armrest.

- In meeting rooms and auditoriums that have tablet arm type desks, you must also remember to have some left-handed desks.
- In lecture halls or meeting rooms that may be used for training or informational meetings and that have a stage, the stage should be accessible via a small ramp that is parallel or perpendicular to the stage depending on its length. It should have all of the necessary audiovisual means to enable persons with sensory disabilities (vision/hearing) to follow along.

All accessible furniture must have rounded corners and thus cannot have edges or protruding items.

When it comes to the measurements of items that protrude more than 15 cm and that limit paths of travel and pedestrian traffic areas, all accessible **benches and seats, traffic signals** below 2.20 m high along paths of travel, **mailboxes and trash cans, tables, fountains and drinking fountains,** and **vending machines** please refer to the section entitled "Street furniture" that describes the allowed measurements and characteristics in detail.

Food services

All of the aforementioned things regarding common areas and types of chairs, flooring, space between furniture, etc. are valid for food service establishments. However, there are certain things that you should keep in mind:

- **Counters of bars and cafeterias** must have two different heights: one 75-85 cm high and another 1.05-1.10 m high. The highest part of the stools should be 75-85 cm high and the lowest part of a normal sized chair should be 43 cm – 45 cm high, have a minimum width of 45-50 cm, a minimum depth of 45-50 cm, and be equipped with armrests.
- The lowest part of all **tables** should be at a useful, obstacle-free height of 70 cm, minimum width of 80 cm, and minimum depth of 60 cm so that a wheelchair can fit under it. The legs should be located at the corners so that the legs of wheelchair users fit underneath the table or round tables with one leg in the center should be used. The chairs should be 43-45 cm high with a seatback and armrests for balance especially for elderly persons.
- If it is a self-service type restaurant or dining area, you must take into account the dimensions of the corridors for customers to get by, the heights of the surfaces that trays are set on, the areas below that must be clear, the depth of the counters, and height of the shelves in order to facilitate their use by wheelchair users, short persons, and children.

All information about the services offered at these establishments must anticipate basic accessibility criteria so that all customers can use it.

The background noise in a bar or restaurant can be reduced if the interior is designed to absorb sound. There are simple solutions like putting down carpets or placing plants, but you can also put up separations that create corners and cozy areas where it is easier to hear the waiter or have a conversation.

Normally bars and restaurants have information written down that they want to communicate to their customers. So, the **price list** or menu of the day that are hung on the wall should be placed at a height that is convenient for wheelchair users or short people. They should also be properly illuminated and no obstacles should be in front of them so that people can approach them. They should have clear letters written in a color that contrasts with the surrounding environment so that it is easy to read for deaf people as well. The menus that are given to the customers must also be legible in the same way. In this sense, as a special service to the blind you could provide a menu written in Braille.

The cash register should have a display facing the customers so that they can see the total price and so that deaf persons can read the price of their bill on the screen.



Typical rooms

Auditorium

Here you can apply the recommendations made for **stands and spectators areas** in the “**street furniture**” section.

Medical service

Ideally, you should be able to adjust the height of all stretchers. If not, they should be 43-45 cm high. The bathroom must also be accessible to PRMs with serious limitations and/or wheelchair users.

We recommend panels and ceiling placards placed at a minimum height of 1.20 m in the center with raised letters and/or Braille.

Library

- All tables should have 70 cm of usable space below the work area. The chairs should be 43-45 cm high and have a seat back and armrests.
- Accessible shelves with books must have a maximum height of 1.40 m and they should be at different levels so that wheelchair users, children and short people can reach them.
- There should be audio books on tape, cassettes, and audio guides with audio description for persons with visual disabilities.

Meeting rooms, conference rooms, consulting rooms, etc.

All tables should have 70 cm of usable space below the work area. The chairs should be 43-45 cm high and have a seat back and armrests.

If a white board is used to write down information, it must have a maximum height of 1.40 m and should be at ground level so that wheelchair users can use it. It would be a good idea for the white board to be at various heights and to have a magnetic loop installed under the floor so that persons with hearing aids could achieve full level of hearing in the “T” position. Also having screens with subtitles (simultaneous written transcription) of the different lectures being given would be a good idea.

Building evacuation and emergency plans

The alarm system should be audible and visible with the same intensity for both. **Fire extinguishers** and hoses must be located at a maximum 1.40 m so that all persons have access. They cannot protrude from the wall more than 15 cm and it is recommended that they be placed in reserved areas that are built in to the wall or the extinguishers should be on the floor or on top of something that is 40-50 cm high.

The signs should have large letters and the emergency exit should contrast greatly in color.

It is necessary to plan rescue areas with adapted stairs and elevators on each floor of buildings for public use that can be used in the event of a fire or emergency

because they are conveniently marked and adapted for persons with reduced mobility. You must also anticipate the possibility of including evacuation ramps only for heights less than 5 m and “furniture hoist” type evacuation cranes for evacuations from the façade for heights greater than 5 m.

Whenever possible, persons with reduced mobility and/or sensory limitations should have an evacuation route that is different from that of the general public in order to avoid risks of accidents, keeping in mind that their evacuation speed is slower than persons who don't have a disability.

In general, the fire protection measures in the section of accessibility should focus on the following points:

- **Prevention:** the reduced mobility of a person advises against trusting in the possibility of total evacuation of the building using emergency stairs or any other type of facilities that require a high degree of mobility and shall depend on the collaboration of rescuers and equipment outside the building in order to proceed with an evacuation in the event of an emergency. This possibility shall be stipulated in the Emergency Fire Plan that these types of buildings are required to draw up.
- **Detection:** the alarms connected to the detection systems must have lights (for persons with hearing deficiencies) and audio warnings (for everyone else).
- **Compartmentalizing**, creating fire sectors that ensure that fires that have started only affect the smallest portion of the building possible.
- **Extinguishing:** having proper facilities and evaluating the appropriateness of installing fixed and automatic fire extinguishing systems in areas of the building that are the greatest fire danger or are most difficult to evacuate.
- **Evacuation:** facilitating evacuation of the affected areas and, if necessary, leaving the building. It is particularly important to keep in mind when compartmentalizing the building into fire sectors that the evacuation of persons in one sector to an adjacent sector entails planning for sufficient space to temporarily hold those persons. So, while it may be very difficult to leave a building that is more than one story high that is mainly used by persons with reduced mobility, it is much safer and more efficient to move them to adjacent protected areas (without architectural barriers and, if possible, changes in level). Other recommended measures are: planning of outside patios, sufficiently large independent lobbies, or any other type of protected areas and sizing the horizontal evacuation routes keeping wheelchairs in mind.



accessibility in transportation

Comfort and safety measures during travel

PRMs, especially ones with physical disabilities and non-ambulatory persons that travel without getting out of their wheelchair usually travel in unsafe, uncomfortable conditions.

Measures for PRMs that use a wheelchair

- Anchor between the wheelchair frame and the vehicle: strong, simple, and versatile.
- Safety belt with at least three anchor points. It should not serve as the anchor for the wheelchair.
- Do not travel sideways or in a position that is perpendicular to the vehicle's direction of travel. Preferably travel facing backwards or at least facing forward.
- Have a seatback with a headrest in order to avoid whiplash due to an impact.
- Headrests with ears and armrests for PRMs with a greater degree of extension of the disability and that don't have balance in the head region.
- Travel slightly leaned back in the wheelchair.

Measures for PRMs with motor disabilities and ambulatory PRMs

- Vertically folding armrests.
- Handles and handrails as comfort measures in aisles, door heads and aisles with reduced dimensions. Higher, firmer seats.

Measures for PRMs with sensory disabilities

- Brightly lighted information on emergency systems and having numerous warning and visual information systems via signs, panels, or monitors.
- Enabling hearing loss users that have hearing aids to properly hear the public address system using magnetic loops.
- Some public transportation with built-in telephones will have to equip them with magnetic amplifiers.
- In emergency situations, blind persons will receive audible information like the rest of the passengers.
- Tactile information with special guide strips on the ground is a special complement that is suitable for large transportation vehicles.

Persons with residual visual disabilities are those that still have a certain degree of vision but also need measures that provide safety and comfort when they travel:

- Light reflecting painted strips are a fundamental item in the event of an emergency.
- Information and visual signing should be taken into account: size and color of the letters and pictographs.
- Provide an adequate degree of lighting with the maximum uniformity possible.
- Avoid using surfaces that produce a glare.

Specific measures taking into account using different means of transportation

Travel by air

Airports

Persons with disabilities should be able to access all of the areas of an airport terminal and carry out the activities required for this type of travel:

- Parking in the corresponding reserved parking space upon arrival at the airport.
- Accessing the area where tickets are issued.
- Boarding and picking up baggage in an obstacle-free area.
- Moving from the boarding gate to the plane and from the plane to the exit.

To do so, it would be a good idea for the airport to have the following services:

- Telecommunication devices for deaf persons.
- Assistance personnel for passengers with disabilities, especially for boarding and getting off the plane.
- Land and boarding wheelchairs.

- Ramps or mechanical elevators and, if necessary, leveled boarding gates or accessible mobile pre-boarding rooms if available.
- Adapted vans with an elevating platform with the capacity for two wheelchair users and their companions that will transport them to the plane.

Aircraft

Recommendations for tending to wheelchair users:

- All aircraft must have reserved seats that have vertically folding armrests which make it easy to get from the wheelchair to the seat.
- These seats should not be located close to an emergency exit so that, in the event of an accident, the exit is easily accessed.
- Wheelchair users can transport their wheelchair free of charge in the hold luggage bay with the rest of the passengers' baggage.

Recommendations for tending to persons with vision or hearing deficiencies:

- Information about the plane's features and existing emergency exits shall be provided on long flights via screens that are easy to understand for everyone, including deaf persons, wherein messages should be communicated using drawings and, sometimes using subtitles.
- For passengers with vision disabilities, some companies make an information sheet in Braille available to them regarding the emergency exits.
- Likewise, guide dogs can travel free of charge as baggage in cases where the regulations of the country of origin and destination allow and in accordance to those regulations.

Accessible Lavatories

Aircraft with more than one aisle and one or more lavatories, especially those used for long haul flights, must include at least one accessible lavatory. This lavatory must enable wheelchair users onboard to enter, maneuver inside, and exit with the same degree of privacy as the rest of the lavatories on the plane. The recommended dimensions shall be a rectangle of 1.30 m wide x 1.30 m deep with a door that has a minimum 70 cm wide access that opens outward more than 90°. Obviously in front of this door there shall be an obstacle-free circle that is 1.20 m in diameter for maneuverability.

Safety and Evacuation

Persons with motor disabilities do not have a good sense of balance and need safety belts that have at least three anchor points and are fastened across the chest.

Currently, emergency exits on planes have inflatable ramps that enable all passengers to be evacuated rapidly. It is recommended that persons with serious motor disabilities always slide down these emergency slides head first (opposite from the rest of the passengers) in order to keep their legs from obstructing the exit because they cannot control them due to their disability and could block the emergency slide.

On this subject, the standards stipulated in **Regulation (CE) No. 1107/2006 of the European Parliament and Council** of the 5th of July 2006 regarding the rights of persons with disabilities or reduced mobility in airline transportation are essential.

Travel by sea

Ship terminals

Obviously, for PRMs to access different ships the docks and piers must be located at the ship's level or shall have mobile platforms with ramps that have a gradual slope in order to overcome any existing differences in level and facilitate access to wheelchair users. In this sense, big ship terminals offer access facilities similar to the ones that exist at airports.

Large Ships

Accessibility shall depend on the type of ship, but in general we can say that ferries, when people are allowed to board via the cargo bays, and large cruise ships have adapted measures that favor traffic and independence of persons with disabilities, including those with sensory limitations.

On the other hand, costal shipping boats must provide essential conditions of safety and comfort such as handles and bars for ambulatory persons that walk with difficulty and areas that are large enough to put a wheelchair user in that is equipped with the corresponding anchors, safety belts and headrests.



Travel by railway

Stations. Train access

The difference in level between the height of the train and the platform is the main difficulty for PRMs.

Ergonomically designed and sized support bars and handles should be installed on the frames of the doors for ambulatory PRMs. It would also be very useful to have mobile stairs for them with steps that have a small rise (≤ 18 cm) and wide tread (≥ 32 cm).

For wheelchair users you should seek out solutions like mobile ramps at each station or various types of elevating platforms that are attached to the train car (convertible stairs or telescopic) or that are mobile (hydraulic or electric).

The train

This section is based on two realities:

- New designs whose technical features try to adapt to universal design needs.
- And the challenge of being able to convert existing equipment to make it accessible which can entail technical difficulties and high costs.

Things that are needed: support bars and places to put wheelchairs with anchors and safety belts.

Travel by highway

- The main challenge in accessibility in buses for travel by highway is the access. In this case, it is the difference in height between the bus stop and the conventional bus's floor that is usually followed by various steps that are rather tall and sometimes have a banister in the center.
- The vehicles are not designed so that all passengers can sit down but predominately so that they travel standing up. This means there is more free space to establish anchoring areas for wheelchairs.
- For that very reason the relatively large spaces in the bus can be a source of risk for accidents for persons with reduced mobility if, on one hand, the necessary safety measures are not adopted, and, on the other hand, the driver of the vehicle drives in an abrupt manner.
- In these city and inter-city services, the driver's attitude and goodwill enable him to stop with precision at the bus stop and possibly help the person with reduced mobility.
- The chaos of city traffic (double parking, parking in bus stops, etc.) is an additional barrier for persons with reduced mobility.

Basic requirements for accessible transportation on buses are as follows:

- Appropriate access systems to erase the change in level between the bus's floor and the sidewalk or "Low Ground" or "Low Platform" type bus stops. Past experience makes it advisable to install the platform which should be done on one of the exits where they don't pass by the typical ticket control next to the driver's seat. That way movement inside the bus is kept to a minimum until the wheelchair gets in place.

- Some small bus companies have given cause for some services that have enabled their use to non-ambulatory persons with disabilities, wheelchair users, have used vertical or inclined lightweight elevating equipment (folding and manually operated), steps that convert into a platform, etc.
- Installation of all of the safety measures (anchors, safety belts, support bars, supports, etc) that prevent possible accidents and facilitate movement within the vehicle.
- Driving as smoothly as possible, avoiding sudden stops and abrupt accelerations.
- Service personnel that is sensitized and trained to help persons with special needs.
- Respect by users of the public sidewalks of the bus stops and the surrounding areas.
- On inter-city busses, the possibility that a PRM in a wheelchair may use the bus requires that the bus have a space reserved for wheelchairs where folding seats are usually located. The best location for them would be right next to the emergency exit where an elevating platform can be installed.
- It should have audible and visual warning devices for persons with vision and hearing disabilities. Most would be connected to a magnetic loop in order to facilitate better hearing for persons using hearing aids in the "T" position.
- A buzzer should be installed in the door head in order to indicate to blind persons that the doors are open.
- Well lighted entrances and exits to the bus, especially for persons with visual disabilities.
- Reserved seating that is a different color than the rest and that is indicated with PMR logos for pregnant women or women with strollers.
- Button to request a stop (no more than 1.40 m high).
- Screen facing passengers that displays the cost of the ticket in the area where payment is made.

Signing

Visual signing

- Entrance and exit doors: the inside and outside of the doors should be colored differently in contrast to the rest of the bus.
- Steps: the edge of each step (including the tread and rise) shall be marked all the way across with a stripe that is 5 cm wide. It shall be colored florescent yellow which shall contrast with the background.
- Entrance/exit platform: the edge of the platform shall be marked in the same way as the steps.
- Seats: they shall be a different color that contrasts with the floor and walls. Seats that are supported by platforms shall be marked in the same way as the steps.
- Stop request buttons: they shall be large and contrast in color.

Audible signing

- Installation of audible warning devices on the door head that work when it opens, informing passengers entering of the number and name of the bus line.
- It would be a good idea for this system to have a sensor to adjust the volume and intensity depending on the amount of background noise.
- Installation of a beacon and GPS system (or any device that is designed in the future) inside the bus that works in conjunction with outside beacons located at the bus stops.
- It shall include a public address system that announces the next stop with sufficient prior notice.
- Once the stop request button is pushed it shall make a sound indicating a stop has been requested.

Lighted signing

- Installation of indicator lights that help locate the entrance door.
- These indicator lights shall work when the door opens and must have the proper light intensity so that it is not masked by the natural light outside.
- The indicator light must blink.
- The level of lighting at the entrance to the bus should be good so as to avoid abrupt changes in lighting.
- When the stop request button is pushed, a lighted "stop requested" sign shall light up.

Closed circuit television (CCTV)

A large CCTV with a monitor shall be placed near the driver so that he can see the passengers getting off the bus.

Signs

The bus must have a minimum of three signs on the outside that provide information about which line it is. These signs must be located on the front, rear and side of the bus on the lower corner of the window that is closest to the entrance door of the bus.

The signs must have good sized characters (numbers and letters) that have sharp outlines, are a different color and are contrasted to the background of the sign (light colored letters on a dark background are recommended). Additional lighting shall not be used in order to avoid a glare on the interior lighting or surface it is covered by.

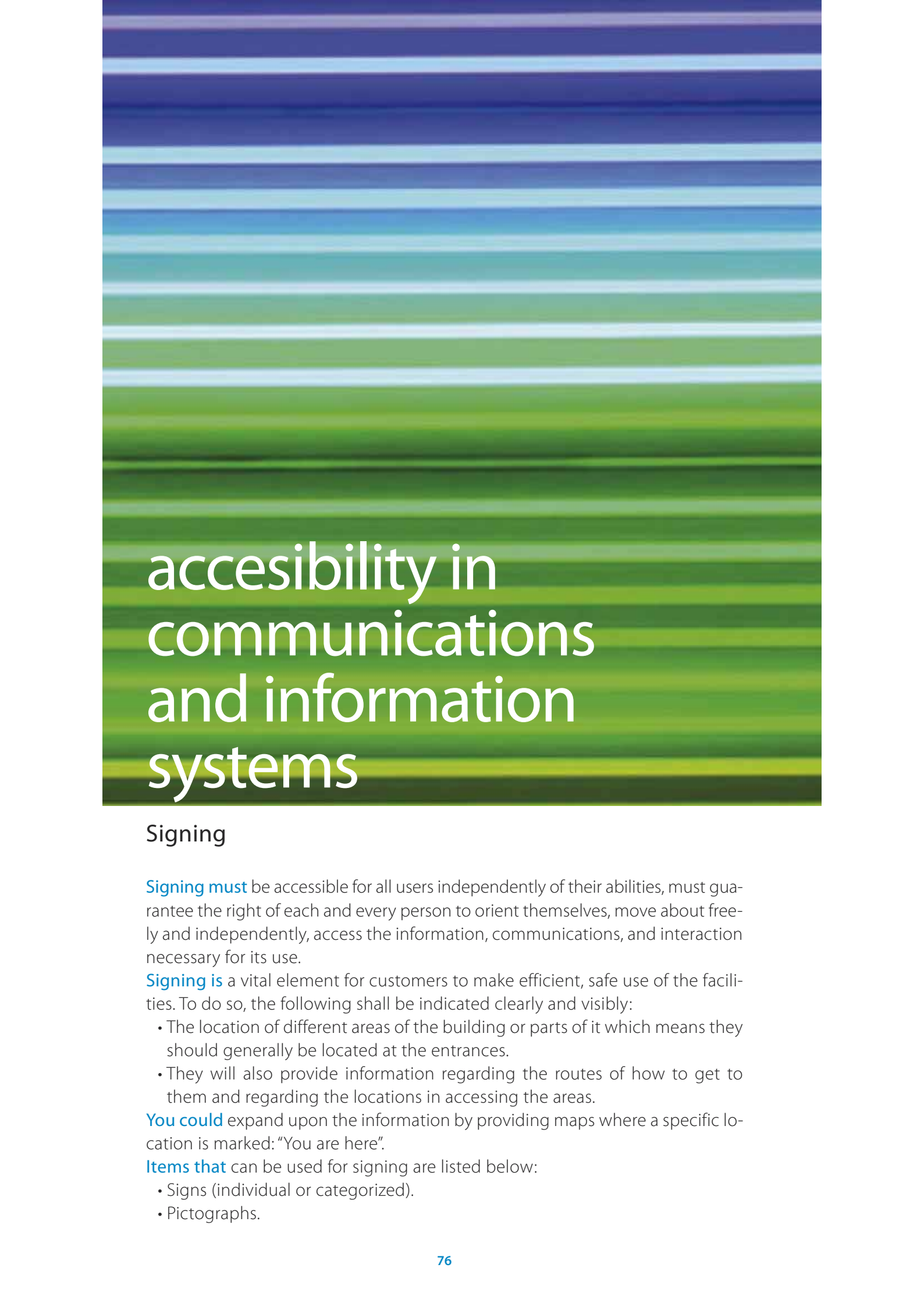
Inside the bus there must be a map of the bus's route that shows all of the stops. It must be a different color from the background of the sign and both should be a different color than the surrounding area. The route must be illuminated inside and outside. Routes, schedules, frequency, and other information shall be provided in writing (large characters) and in Braille.

Stops

Stops shall be indicated in order to facilitate their location by means of the following:

- Bus stop sign: usually made of a pole and a sign or a combined pole/sign.
- The bus stop shall have a bus shelter if it can be installed. If not, the sign post should not obstruct the path of travel on the sidewalk and shall allow an obstacle-free passage width of 1.00 m minimum.
- Signal transmitter-receiver that can be activated by blind passengers (via remote control) in order to audibly inform them that the bus has stopped at the bus stop.





accessibility in communications and information systems

Signing

Signing must be accessible for all users independently of their abilities, must guarantee the right of each and every person to orient themselves, move about freely and independently, access the information, communications, and interaction necessary for its use.

Signing is a vital element for customers to make efficient, safe use of the facilities. To do so, the following shall be indicated clearly and visibly:

- The location of different areas of the building or parts of it which means they should generally be located at the entrances.
- They will also provide information regarding the routes of how to get to them and regarding the locations in accessing the areas.

You could expand upon the information by providing maps where a specific location is marked: "You are here".

Items that can be used for signing are listed below:

- Signs (individual or categorized).
- Pictographs.

- Maps: including raised maps so that persons with visual disabilities can orient themselves.
- Models: that persons with visual disabilities can touch (with the use of identifying colors for floors and areas that contrast with the colors of nearby items like vertical walls, doors, handrails, door protectors, etc).

Characteristics and typology of the signing and information items

The vertical elements shall not be an obstacle for persons with limitations or reduced mobility and any person in general.

Informational panels shall be placed in such a way that reading them does not block the path of travel nor cause interruptions in the flow of traffic. It is recommended that all panels that require persons to stop to read them have seats, ischiatic supports, or adapted support bars. In addition:

- They shall be detectable from a considerable distance of 200 m away if the user approaches via a means of transportation or 50 m if he approaches on foot.
- They shall be equipped with additional sound devices that are comprehensible to persons with a total or partial visual disability.
- If the signing is located in a public use area for pedestrians, it should be able to be identified via touch with raised letters and contrasting colors.

The signing of routes, urban planning elements and other diverse urban elements in the form of a sign or signal must have clear contours, vivid coloring, and be contrasted with their background with letters that are 4 cm high minimum that are located at a height of 1.50 m from the ground and that can be approached up to 5 cm away. If they are illuminated, the lighting shall always be on the outside so that they can be ready from close up and it shall be placed in such a manner as not to be an obstacle.

Tactile information for persons with serious visual disabilities should be able to be detected on the pavement as well as in the written or graphic information that is on maps or signs that are placed at a height of 1.20 m to 1.60 m.

Pictographs: this is a system of writing using pictographs or drawings that represent concepts and are in addition to the texts, and even on different ceiling placards or information signs for the general public. Signing on playground equipment is varied. It shall be adapted for children using signs that are centered at 1.10 m high with an upper edge limit of 1.25 m. They should include bright colors and pictographs that are easy to understand. It would be a good idea to color the ground in order to differentiate areas. If the signs are illuminated, they must be illuminated from the outside so that they can be read from close up and the lighting should be placed in such a way as not to be an obstacle nor create a glare. Their perimeter must extend to the ground.

Characters: font, spacing

- Choose a font that is quick and easy to recognize for symbols and words (Arial, Helvetica, Univers 55, Tahoma, Times New Roman, etc). Try to avoid using italicized letters, simulations of handwriting, and gothic and baroque fonts.
- Short lines of text are easier to follow. The ideal length would be 50-65 characters.
- The spacing between lines should be 25-30% of the size of the font.

- All texts, booklets, and posters should be written with capital and lowercase letters since all capital letters are generally more difficult to read because they don't have up and down graphics that accentuate the differences between the letters as is the case with lowercase letters (d, f, t, g, etc).

Size

- For a person with a visual disability with approximately 10% vision, the minimum sizes on signs will depend on the distance they can be read from.
- Distance, minimum size, maximum size.

Distance, Minimum size, Maximum size

Distance	Minimum size	Maximum size
100 m	-	60,0 cm
50 m	-	30,0 cm
≥ 5 m	7,0 cm	14,0 cm
4 m	5,6 cm	11,0 cm
3 m	4,2 cm	8,4 cm
2 m	2,8 cm	5,6 cm
1 m	1,4 cm	2,8 cm
50 cm	0,7 cm	1,4 cm

- With respect to the proportions, it is recommended that the relationship between the width and the height of capital letters (A, B, C, etc) be 0.70-0.80 cm.
- The size of the pictographs should keep a proportion of 10 x 5 and they should be a minimum height of 10 cm and a minimum width of 5 cm.

Color and contrast



- Signing should contrast in color with the surrounding area where it is located and the letters or pictographs should contrast with the background of the sign. We recommend that the color of the indicators, pictographs, doors, etc. also contrast with the background in order to increase visibility.
- The signing materials should have a matte finish or a polish factor of less than 15%.

Recommended color and contrast combinations

Details	Large surfaces
White	Dark blue
Black	Yellow
Green	White
Red	White
Blue	White
Black	White
Yellow	Black
White	Red
White	Dark green
White	Black

Lighting

- Lighting should be put in places where it doesn't interfere with reading and should light the sign well day and night.
- Always make sure the lighting does not create shadows on the sign.

Location and design

- It should be attached in such a manner that neither the sign nor the post represent an obstacle or risk for persons with visual disabilities.
- All of the information must be able to be read from up close and should be set up in such a manner so that people can approach the sign. No obstacles should be placed in front of it.
- To make it easier to read, the information should be concise, basic, and use simple symbols.
- The height of the signs should be 1.45-1.75 m from the ground. It is also recommended that you place these signs on inclined maps.
- If a hanging poster is put up, the bottom edge must be above 220 cm and under no circumstances should it block or impede the visibility of safety signs.



Tactile signs

Tactile signs are essential for persons with visual disabilities or poor vision. Tactile perception enables them to recognize shapes and letters that help them read and identify (for those who know how to read Braille) what we are trying to say on any informational panel or printed information. It is therefore necessary to combine the two types of tactile signing, one using Braille and the other using large, raised letters.

To be effective, a tactile sign must have raised letters and not engraved letters. The height should be 1-1.5 mm for letters and 2 mm for symbols. The width of the outline should be 1-1.5 mm for letters and 2 mm for symbols. The edges must be slightly rounded. The minimum character height should be 15 mm and maximum height 50 mm.

Sign language

Relatively often, deaf persons are excluded from graphic signing and internet access plans. Regarding this group, it is necessary to point out that most deaf people, especially those who are pre-speech or born deaf, do not know how to read and write and their natural method of communication is sign language. This fact is unknown to most people and that is why many times they are excluded in accessibility plans considering that it is sufficient to just translate voice messages to written text in order to make them accessible, but that is insufficient. That is why it is a good idea to include sign language videos.

Printed documentation

It is important that all **written or printed information** (brochures, dossiers, etc) that can be given or explained adhere to a series of requirements:

- Not all letters can be read with the same ease.
- Simple letters without decoration, with clean edges are read better because a lot of details make them harder to see.
- Straight letters can be more easily read.
- Bold letters do not improve legibility because they reduce the spaces inside the letters.
- Letters whose body (width related to height) is proportionate in order to avoid having the spaces inside which normally help identify them disappear or get filled in.

- Likewise, there must be a relationship between the height and width of capital and lowercase letters. The ratio should be 3:2.
- The vertical legs of tall letters must not be prominent, no more than 17.5% of the height of a lowercase "o".
- Things written in all capital letters are harder to read and cause a 10 to 20% reading efficiency loss. Text written with combined letters can be more easily read. (Capital and lowercase letters).
- Each letter must be written clearly and should be easily distinguishable, but should form a harmonious ensemble.
- As for size, generally letters that are more easily read are those that are written in Universal, Arial or Verdana, Helvética, etc. font, size 12 and 14.
- When the font size is greater than 12 mm, it is better perceived in negative and font sizes that are less than 4mm are better perceived in positive.
- Increasing the font size of printed letters helps persons with vision problems and elderly persons understand the content better.
- All leaflets and informative brochures should have a version in Braille (ideally they should be printed and in Braille writing at the same time).

Websites

A **website** is accessible when it has been designed and programmed so that its contents and services are available to all persons no matter what their web browsing context is. It is necessary to guarantee access to the website under equal conditions and the same level of independence for all persons, starting with the websites of the various Public Administrations which should be accessible.

However, for persons with disabilities, accessing the internet is, in most cases, more critical than for the general population who has easier access to traditional channels of information. That is why it is important to keep in mind a series of standards and basic premises:

- Standards can help programmers and webmasters to identify and resolve accessibility problems. Aspects like the same layout of keys on the keyboard, on and off colors, and a mechanism for navigating the menus, eliminate many of the barriers for persons with disabilities.
- You must also keep in mind that persons with disabilities use specialized hardware and software (technical aids) to surf the internet. Website programmers and developers must keep in mind that the context of use of the internet is very different from one user to another. That is why websites should be programmed correctly so that these technical aids work efficiently and so that the information is shown independently on the computers and applications they use to surf the internet: graphic browsers, textual browsers, voice browsers, technical aids (screen readers, head mouse, magnifiers,...), using only the keyboard, etc.

In addition, accessible websites will also benefit persons who don't have a disability, ensuring that all sections are easily navigated and can be accessed using a variety of devices and via various situations: slow connection speed, mobile phones and PDAs, information kiosks, without using the mouse, etc...

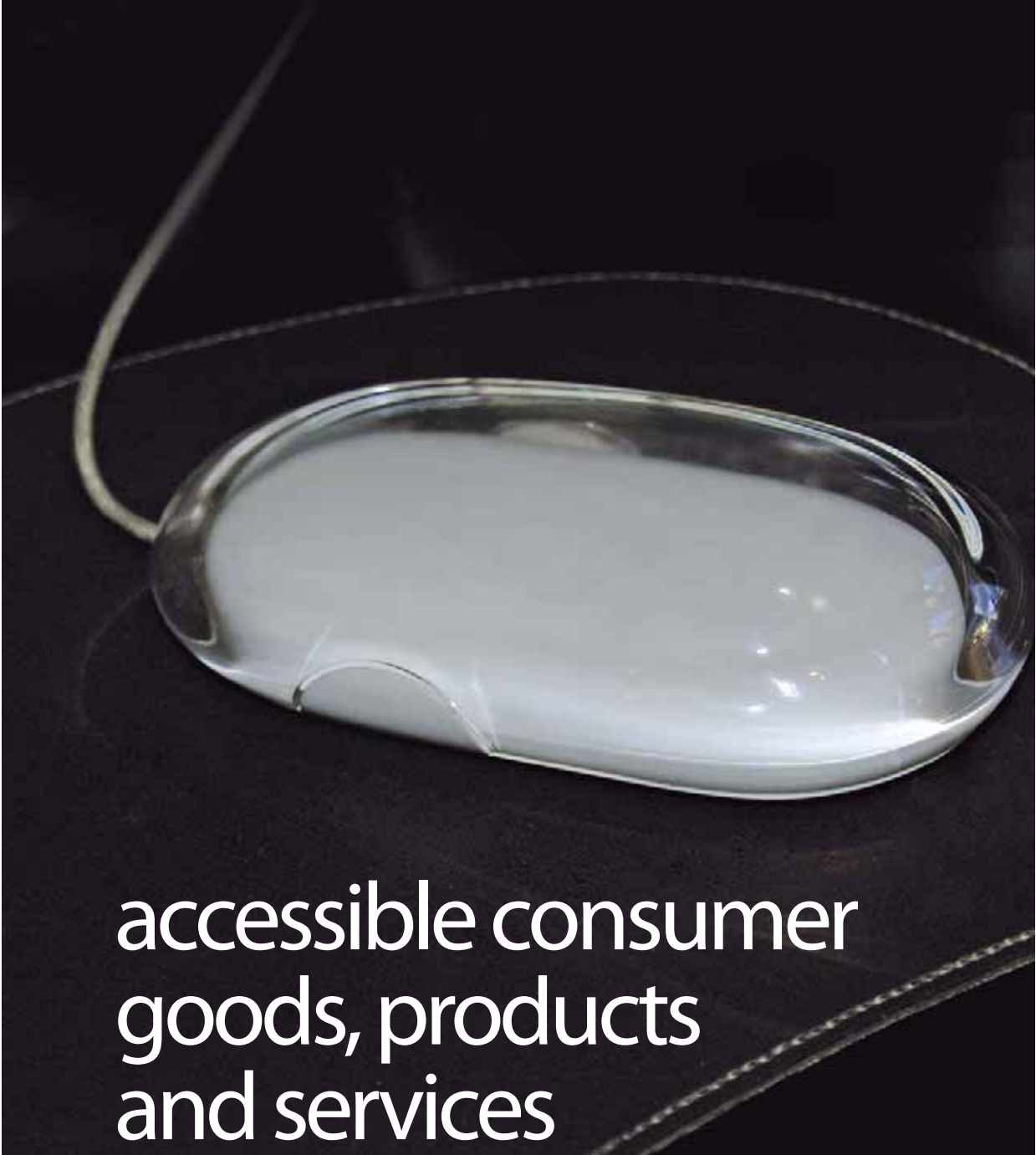
It is important to point out that the "Design for Everyone" strategy on the internet consists of making one website or portal for all users and not designing areas that are specifically for persons with disabilities because this would not adhere to the premise of standardization.

The accessibility guidelines for Web content 1.0 published by the WAI are considered de facto standards in the European Union. The guidelines are organized in 14 general standards that are divided into a series of control points that any web designer can easily verify. They are defined at three levels of adaptation to the standards: "A", "double A" (AA) and "triple A" (AAA).

That is why **we recommend:**

- Images and animations. Use the alt attribute to describe the function of each visual element.
- Image maps. Use the map on the client side and text for active areas.
- Multimedia. Provide subtitles and transcriptions for the sound and descriptions of videos.
- Hypertext links. Use text that makes sense when it is read out of context.
- For example, avoid using "click here".
- Organize the pages. Use headings, lists, and a consistent structure. Use CSS for layout whenever possible.
- Figures and charts. Summarize them or use the "longdesc" attribute.
- Scripts, applets, and plugins. Offering alternative content if the new functions are not accessible.
- Macros. Use the "no frames" function and significant titles.
- Tables. Make sure that line by line reading makes sense. Summarize.
- Review your work. Verify. Use the tools, checklist, and guidelines at **<http://www.w3.org/tr/wai-webcontent>**. Even though you should use these tools, they cannot fully guarantee accessibility by themselves. That is why meticulous work by hand must be done.

Finally, it is important to point out that accessibility to websites is not the same as the usability of the site. As we have seen, the first concept focuses on all users, no matter what their personal or material means are, can access all of the content on the site. The second focuses on the user's perspective, making reference to the user friendliness and user interaction with the internet. To measure accessibility of a website, just follow the WAI guidelines published by the W3C, however, usability does not have any objective metric criteria. However, this concept has serious implications for users since it reduces the learning curve, means a reduction of training costs, full system use, and reduces the impact of change. Indicators used to measure usability are: effectiveness, efficiency, and user satisfaction.



accessible consumer goods, products and services

Some people use technical aids to access information and communication. These aids include screen readers, telephones, and programmable keyboards. If the product is not compatible from the outset, it should at least be compatible with the help of the proper technical aid. To do so, we recommend that you offer people different ways of controlling the product and different ways of receiving information: a tone and icon, voice and keyboard recognition, clicking with your mouse, and direct access from the desktop.

Accessibility tips for computer technology product designers

Product designers should develop products keeping in mind the different needs:

Speech deficiencies

They can be a result of physical or cognitive limitations and both aspects should be considered when designing a product. The main technological barrier is voice recognition, especially on independent systems that do not learn user speech patterns. In these cases, an alternative method to enter should be provided and the product should be able to be connected to technical aids for communication.

Persons with cognitive difficulties

The following are barriers for these persons: alarms, multiple instructions related to tasks, complex words and language, codes, PIN numbers, etc...

They could benefit from the following solutions: Reminder notes, aids related to the context, programmers, timers, images instead of text or repetitions.

Persons with hearing deficiencies

The following are barriers for these persons: alarms, background sounds, direct speech, telephones, televisions, films, and live performances.

They could benefit from the following solutions: amplification or clarification, alternative methods (visual, text, text telephones, subtitling, tactile), gestures, sign language, interpretation, or mediation.

Persons with visual deficiencies

The following are barriers for these persons: warnings, screens, mouse, written text, colors, objects, television, films, and performances.

They could benefit from the following solutions: increased size, high contrast, clarity, voice or tone synthesis, tactile keys or Braille.

Persons with dexterity deficiencies

These persons face the challenge of writing, typing, using a mouse, carrying out tasks that are timed or where objects must be held, inserted or assembled.

They could benefit from the following solutions: stabilizers, joysticks or other instruments instead of their fingers or substituting physical functions for computer functions.

Consumer goods

Keyboards

There is a wide range of these devices that provide interesting services to persons that cannot use conventional keyboards and mice.

- **Ergonomic keyboards:** these are designed to reduce tension and load on fingers, hands, and wrists. They can include a wrist rest.
- **Separable keyboards:** these can be divided into two or three parts and each one can be independently oriented so that it adapts to the user's needs.
- **Built-in mouse keyboards:** it could be a trackball or touchpad mouse, requiring less range of motion to use both devices.
- **Plastic keyboards:** designed for industrial use. They are waterproof and resistant to other materials like saliva. They can be used by persons that have saliva control problems.
- **Expanded or Reduced keyboards:** their total dimensions are larger or smaller than conventional keyboards.
- **One-handed keyboards:** these are keyboards with a special shape and layout of the keys to boost efficiency in using it with one hand. There are right-handed and left-handed keyboards.



- **Virtual** substitute it with boards are programs that ter screen. They work simultaneously type without having to press a physical sign, access is provided in two ways: Using a mouse

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Mouses

There are various types of mouses:

- **Head mouse:** movements of the user's head are transformed by the system into cursor movements on their computer screen. They have a transmitter and receiver. They work via ultrasound and infrared.
- **Virtual mouse:** this type of mouse has on-screen click and movement options. They work by using a button. They have a scan that is used to access the desired option either via movement or by clicking.
- **Facial mouse:** this controls the movement of the pointer and clicking with a webcam that is focused on your face. The system analyzes the movements of the user's head in order to carry out commands.
- **Trackball mouse:** this mouse is good for users that need extra help clicking and dragging because the click-n-drag function makes it so they don't have to continuously press a button to mark, select, and drag an item. This function stays selected until there is a second click which makes working with it easy and allows the hand to be in a relaxed position.
- **Eye-controlled mouse:** this enables a user to move the mouse pointer to any place on their computer screen by simply looking at that place. It consists of a camera that can be put on a normal computer and that records the movements of the retina. You can click by slowly blinking or keeping the pointer in a certain place for a specific amount of time.

There are also programs on the market that facilitate the use of a mouse for persons who shake or for performing all of the functions of the left and right button, including dragging windows without having to click on a mouse button.

Access via clickers or switches

These are devices that use any controlled functional movement that a person may have. There are various types of programs:

- Transparent programs that work with standard applications. They establish a scan of the entire screen and you are able to select items by using a clicker.
- Other programs enable you to scan any application. An automatic scan is produced by the different options that appear on the screen and you choose the desired option using the clicker. In order to make it work, you need an external clicker that is connected to the mouse.

There are also closed-source text editors. They can be used with one or two clickers, a mouse, joystick, or keyboard.

Large clicker

The switch has a rough surface so that it can be used by foot or hand.

Voice recognition programs

These are applications that allow you to control your computer using voice commands. You can write, open menus, create macros, browse the internet, etc. It requires that you talk without altering your voice and you must train the program and work in a quiet environment. Those that are used by persons with disabilities must be 100% hands free.

Screen readers and magnifiers

Allow more flexible access to the screen or for large organizations whose users have a series of visual needs.

Braille line

This is a Braille transcription terminal for the Windows operating system.



Programs for the development of learning for persons with special needs

Reading and writing development

There are programs that have been specifically designed for deaf persons that can also be used by the general public. Some of these programs have the following applications:

- Processing of alphanumeric symbols at different levels as they incorporate isolated symbols (letters and numbers) or sequences of legal segments (syllables and words), organized segments (sentences and clauses) or sentences (texts with semantic content).
- Sign language editors that enable you to create texts in written language and translate them to graphic language or sign language.
- Improvement of abilities related to reading comprehension and learning how to read and write as well as reinforcement of reading and writing.
- Activities to work with instrumental reading, writing, and mathematical techniques.

Learning sign language

This program's purpose is to teach and transmit messages using sign language, either to begin learning sign language or to look up definitions, synonyms, and the configuration of a specific sign.

In this sense, there are also different dictionaries that compile one part of the basic vocabulary in Spanish sign language or new signs that have come about in various specialized fields: education, legal, sanitary, etc., accompanied by a word or Spanish expression that is its translation, a definition, and an example.

Cued speech

Cued speech is a system of manual codes without any linguistic value. It is a system that combines lip reading with eight configurations of the hand that are made in three different positions with respect to the face. The handshapes enable you to identify consonants whereas vowels correspond to different places the handshapes are made.

Dactylology

The dactylology alphabet is the manual alphabet used by the deaf community. It uses hand positions for each letter of the regular alphabet. It is not usually used as a communication system but rather as a complement to sign language in order to refer to proper names or express an idea the person doesn't know the sign for.

There are computer programs for viewing the configurations of the language whose purpose is to train and improve articulation and verbal fluency. One feature of these programs is that they offer a graphic response to verbal production (visual feedback) and can be especially useful to persons with hearing disabilities because they enable them to view the configuration of the sound articulated and provide feedback of that which is said.

Necklaces speech pathologist

Children who have phonology, attention or cognitive development problems can use these.

They help train the intensity and duration of articulated sounds. They have the help of additional materials that can be handled by the user such as wooden cylinders and balls. Some of these programs have the following functions:

- Visualizing voice because they have an on-screen graphic representation of a sound or acoustic signal made in the microphone.
- Pronouncing phonemes. The program responds by viewing the phoneme made or by controlling games using different phonemes.
- Stimulating language development using analysis and thinking abilities about some sound components of the language.
- Favoring hearing perception. They present different hearing memory and sound discrimination activities.
- Speech therapy treatment of the aphasia in adults, ordinary education, or students with needs to exercise their linguistic competencies in the field of comprehension and oral or written expression.

Products

- An **audio book** is a book that is narrated and recorded in audio format normally on a CD.
- You can also find **cognitive stimulation** programs that are interactive computer programs and multimedia for the stimulation and development of the cognitive abilities of adults.
- Subtitling **glasses** for deaf persons that improve accessibility (for example, at the movies).
- Assistance **robot** for persons with disabilities or elderly persons.
- **Mobile phones:** there are models that are specially designed for elderly persons and persons with disabilities. Specially designed to be easy to use and with a personal alarm feature.

In general terms we should point out the following features:

- Keypad: good contrast between characters and the background color, tactile dialing on the number 5 key, large letters and non-slip keys.
- Screen: big so it is easy to read and write. Adjustable font size and contrast.
- Phone functions: voice activated dialing, voice management of phone functions, built-in inductive loop or the possibility of adding one in order to avoid interference with hearing aids, lighted sound, and vibrating indicators of incoming calls, receiving of messages, calendar alerts, loud volume and adjustable volume for voice reception and the ringtone, instruction manual in Braille and/or audio.

These phones, in addition to the common features (video conferencing, voice messaging, messages to a landline, voicemail, instant messaging and webmail) include other specific applications for this group of persons like: localization services, remote diabetes control, real time monitoring of the electrocardiogram

of patients with cardiovascular diseases by healthcare professionals, reminder messages to take medication or the option that enables a person to never lose their phone numbers.

- **Accessible virtual guides for AVGM museums** with the objective of showing museum content in an accessible way for everyone on portable UMPC devices (Ultra Mobile PC).
- **Accessible digital television:** taking into account that Law 10/2005 of the 14th of June on Urgent Measures for the promotion of DTV; in Additional Provision 2 guarantees the accessibility of DTV to persons with disabilities through the development of studies and software and hardware tools to make digital TV accessible for everyone.
- Portable **color recognition** with voice feature for blind persons.
- Natural/artificial light **discriminator** for blind persons.
- **Adapted wheelchairs** with telephone access, environment control and sensors.
- Programmable **communicators** with different learning levels for persons with mental disabilities.
- Development of **educational toys** based on electronic and photonic systems.
- **Optical aids for persons with poor vision** made of high powered lenses that help persons with poor vision take full advantage of what vision they still have. They can be added to glasses or be used manually. The use of optical aids not only does not damage their vision but keeps it active. Here is a list of some of them:
 - **Magnifying glasses** whose magnifying power is between approximately 3 and 20 diopter. The higher the magnifying power, the smaller the diameter the magnifying glass and field of vision. There are various types of magnifiers:
 - **Lighted magnifier.** They provide a great amount of light with minimal heat. If they also include an adjustable lamp, the articulated arm enables you to move the head of the magnifier to any angle and length in order to position it at the proper focal length.
 - **Stand magnifier.** This allows you to work hands free. This model adjusts to different angles and provides exceptional clarity from edge to edge of the magnifier.
 - **Bar magnifier.** Designed to allow you to read without reducing your horizontal field of vision. Some have a slide rail to help you continue reading.
 - **Hanging magnifier.** This magnifier hangs around your neck with an adjustable cord.
 - **Foldable pocket magnifier.**
 - **Microscopes.** This is a recommended optical aid for performing close-up tasks. It allows you to have your hands free and gives you a greater field of vision than a handheld magnifier. It enables you to see objects clearly when you zoom in. They are prescribed for use as a monocular or binocular.
 - **Telescopes.** These are optical aids that people with poor vision use in order to perform tasks from far away. They are different from conventional binoculars in that they are smaller and weigh less and can also focus at short distances.

- **Video games:** simple video games are an intuitive way to start familiarizing oneself with how to use a computer or a new interface.

Video games are not only fun, but also educational. In some cases and under certain control, they can be beneficial to improve time-space organization, eye-hand coordination, quickness of reflexes, memory, etc.

If you associate an exercise machine to a video game, it can be a stimulus for sports and rehabilitation. The video game console could be considered a rehabilitation tool in this case.

- **Usable controllers**

For persons with very little mobility in their upper limbs, the greatest problem is the controllers, joysticks, or joypads (the interface between the user and the machine). This problem gets worse with handheld games where the reduced size is another inconvenience and with new consoles that substitute buttons for movement, making it difficult for persons with limitations in their mobility to use them.



Services and technical aids

Services

The different services can be:

- Systems that add to traditional stationary telecare, mobile telecare and personal assistance with a wide variety of assistance services.
- Intelligent personal alarm monitoring systems that enable you to know where the person wearing the device is at all times.
- Localization and voluntary control service for persons who are especially vulnerable.

These services use one of the following technologies:

- GSM technology (Global System for Mobile communications) that uses mobile technology to calculate position.
- 3G technology, UMTS, with high speed access to the internet and high quality multimedia content and that uses its own network, quicker and more secure, with worldwide coverage or HSPA that provides high speed access to internet, and sending and receiving email.
- GPRS technology: this communication is based on data packets. It allows voice and data communication simultaneously. It provides high data transfer rates and uses GSM networks.
- GPS technology: it is a system made up of a network of satellites and GPS receivers that allow you to determine your position accurately. It has a margin of error of 5 meters. There are also mixed methods that combine GSM cell phone technology with GPS. This combination goes together perfectly.
- AGPS technology (Assisted GPS). This complements GPS technology. This technology provides the AGPS receiver with data so that it doesn't have to download it from the satellites, reducing the startup time for the receiver and increasing the availability and duration of the battery.

Technical aids for access to ICTs

There are different technical aids that provide solutions to problems that can arise with each type of disability. That is why we distinguish between:

Visual disability

- Substitution of the screen for a speech synthesizer that reads what should appear on the supposed screen. The system speaks to the user and informs him who is calling, what messages he has received, etc.
- Other applications act as a PDA enabling limited functions that are programmed and enable you to connect to other devices making way for home automation.

Hearing disability

- Traditionally the adaptation of a landline to the needs of persons with hearing disabilities was done via so-called Call Centers that received phone calls from deaf persons for persons who could hear and vice versa with the intervention

of an operator that would read what the deaf person was writing and wrote to the deaf person what the person who could hear was saying.

- Nowadays, thanks to mobile phones, deaf persons can have a conversation via text messaging in real time between users of the same system or from a telephone or conventional PC.

Other means of overcoming barriers that persons with this disability face are:

- Artificial Conversation System that automatically and directly allows real time global phone communication (fixed, mobile, and internet network) between deaf and hearing individuals.
- Videophone conversations have appeared as an alternative for using sign language and reading lips as a means of communication.

Physical disability

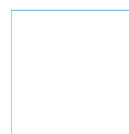
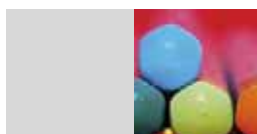
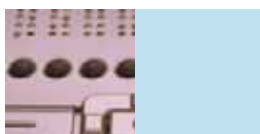
- New systems of gripping and voice control.
- Hands-free use of mobile phone and access via visual scan.

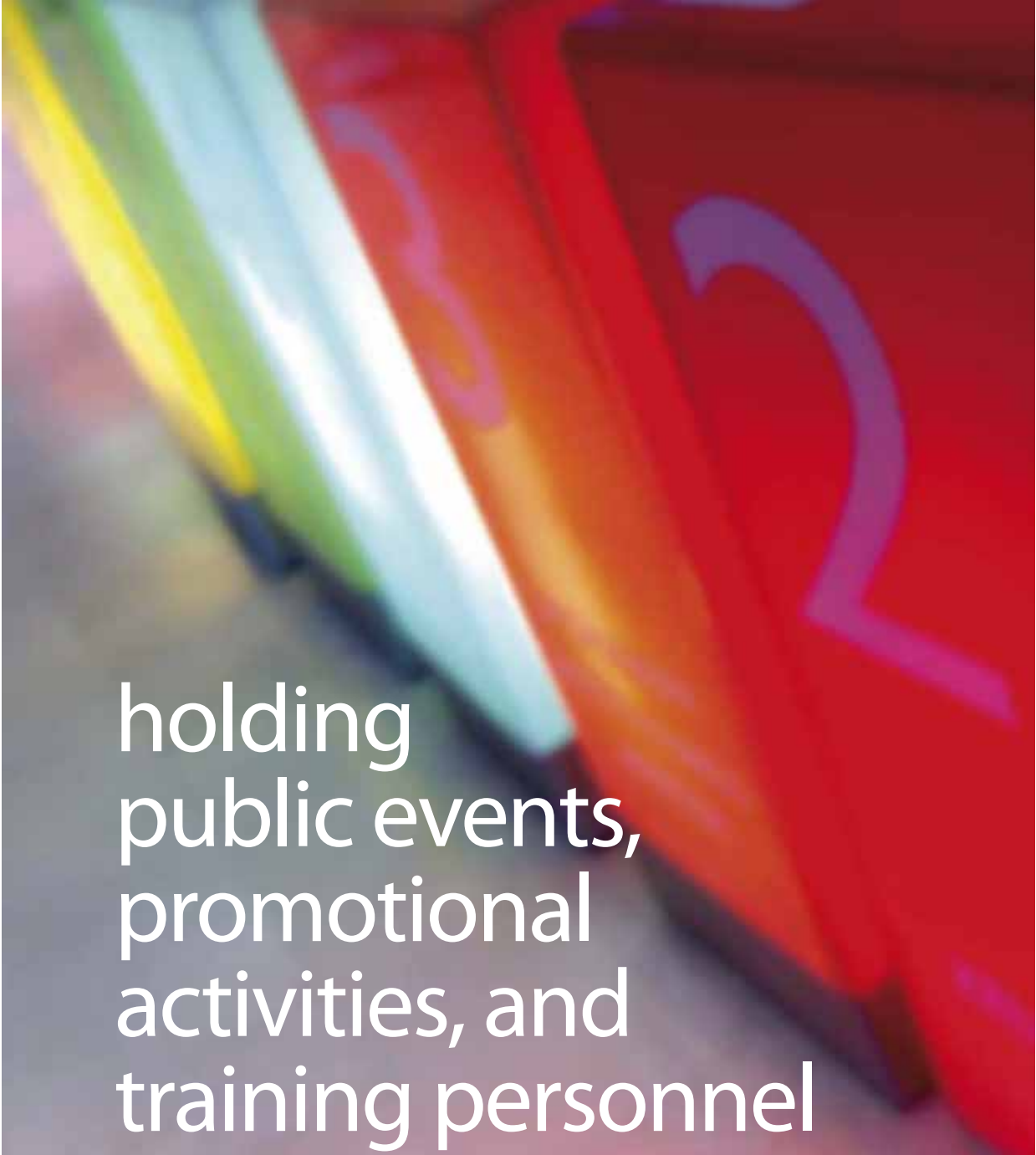
Psychological or intellectual disability

- First, simple, basic functions are needed.
- Language is also important. It should be equally simple and comprehensible at all levels.
- The items that appear on the screen should be able to be viewed clearly, bigger in size and greater contrast if necessary. The keypad should be bigger as well.
- Photos, drawings, and bright colors can also help and guide.

Mobile terminals

- The basic function is to establish a voice call to a control center and/or a family member. It also communicates events, alarms, emergencies, etc..., sending SMS messages, allowing identification of the users and alarm generated.
- Other terminals allow you to define a perimeter that the person carrying it can move around in. If they leave that area, the device activates an automatic, assistance, or user safety alert.
- Finally, some terminals allow localization inside and outside.





holding public events, promotional activities, and training personnel

Holding public events

Where it will be held and how to get there

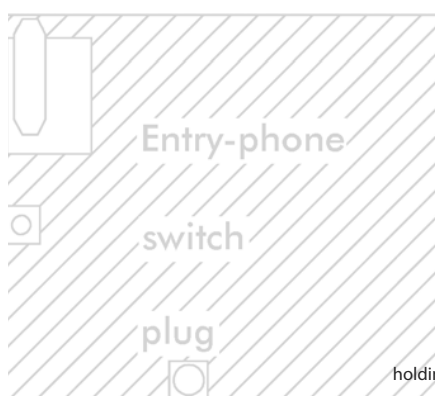
- Whether the event is held at the company or not, a place should be chosen that is accessible either outside or inside.
- Take into account persons with reduced mobility and/or communication, elderly persons, and strollers.
- Have maps and contoured models with contrasting colors and good signing regarding the location.
- Guarantee accessibility to the place where the activity is going to be held:
 - If the area is not fully accessible, you must **plan and indicate alternative access routes**. Under no circumstances shall the alternative route be more than six times the length of the route it substitutes.
 - It is important to **indicate** the route clearly with big letters so that persons with visual or intellectual deficiencies can find the rooms, locations, etc. Indicate where the adapted restrooms are.

- **Reserve places in the front rows** for persons with hearing or visual disabilities which will guarantee that they are close to the speakers or the alternative communication systems (interpreters, subtitling, etc.). As well as for deaf and blind persons with their respective interpreters.
- **Reserve or provide areas for wheelchair users** and their companions that will enable them to follow the activity.
- Prepare an **access** to the platforms (stages) for persons with mobility difficulties.
- Make sure you have **marked reserved parking**, handicap areas or easy access areas close by, with adapted public transportation at buildings or outdoor areas. If none of these alternatives exist, you must reserve an area for parking.
- If necessary, consider having an **assistance service** for persons with vision or mobility problems that is in a place that is easy to locate. They may need it to enter or exit, get to their seat or the restroom, call a taxi, or fully participate in the activity.
- Currently there are various regulations that regulate access to the area by **persons with reduced vision** that are assisted by guide dogs.
- When they arrive at the event, all **information booths** that are not manned by staff shall be equipped with additional information systems such as graphic panels, subtitled audiovisual systems, and tactile maps.



Physical spaces: routes

- For paths of travel inside where there are access control mechanisms, there must be an alternative passage that allows persons with any type of disability to enter. If there are turnstiles or any other access control system, there must be a usable alternative entrance for persons with limited mobility. (Ideally, the minimum clearance for standard access control systems would be 0.80 m). The same measurement must be used for groups of persons in order to avoid crowding at these types of entrances.
- If there are rugs, they must be firm, with short fibers, entirely fastened and permanently fixed to the ground.
- A guide strip shall be placed at the main entrances.
- The flooring shall be a hard, smooth, non-slip, continuous surface.
- In order to warn persons with visual limitations, handrails shall indicate when there are changes in slope or direction of the route by points of inflection at the beginning and end of each section and shall extend 0.30 m past the beginning and end of each section in order to improve user safety.
- Any fixed or mobile object that is located at a height of less than 2.20 m shall be considered to be an obstacle. Likewise, any information that is not perceptible to at least two senses shall be considered to be an obstacle.
- If there is an obstacle or an item that is located at less than 2.10 m high, its perimeter shall be extended all the way to the ground.
- The width of the routes shall be a minimum 1.00 m.
- All displays that have glass cases should have their products located between 0.90 m and 1.50 m high. Ideally they should be at 1.20 m high.
- Design artificial lighting in such a way as to maintain a line of travel: a line of lights on the ceiling (in a hallway), lights located on the walls that are all at the same height leading in one direction.
- Place furniture in such a way that it doesn't interfere with the basic path of travel.
- Permanent or temporary graphic information panels shall be located parallel to the direction of travel and, whenever possible, adjacent to a wall or surface so that they are not hidden by any obstacle. They should never be covered with glass and should allow people to approach and interact with them.
- It is important to plan the layout of visual and acoustic signs to indicate routes and emergency exits.



Interactive signing and communication systems

To set up complementary information systems you should take into account the following recommendations:

- Their location should be accessible and easy to locate.
- The central part of the panels should be placed at a height of 1.20 m in order to guarantee that persons with difficulties handling things can interact with them normally.
- All information in text format must also be audible and vice versa.
- All audiovisual devices that are used must have amplification and audio signal improvement systems.
- There must be audible confirmation messages for all of the activated actions.
- The controls, keyboard, and buttons should be adapted with labels or high contrast icons with large, raised letters and Braille.
- The screens should be anti-glare and have a good contrast.
- The information should be clear without too many options on one screen and should allow a prolonged response time.
- All touch screens shall be equipped with an alternative access system to the information for all persons who need it. This system shall be based on the verbalization of different information options and shall be activated by pushing a marked, accessible area that is sensitive to the touch.
- All signing shall have sufficient contrast. The best contrast is made with light colored letters on a dark background.
- You must plan on the possibility of having a sign language interpreter. The interpreter shall stand on the platform in front of the seats that are reserved for persons with hearing disabilities.
- Real time subtitling services is a good alternative. Computerized subtitling is a system that combines humans and technology. On the meeting room screen there shall be an image of the current lecture or face of the speaker, and on the top or bottom line of the same screen will be the written text of spoken message.
- Likewise, the room shall have a magnetic loop around the perimeter in order to facilitate better hearing for persons with hearing disabilities that use hearing aids.
- When a public address system is used at an event to communicate, there should also be an alternative communication system using writing or symbols. It would be a good idea for the room or outside area to have a **led** screen where the text of all of the messages given over the public address system appear.

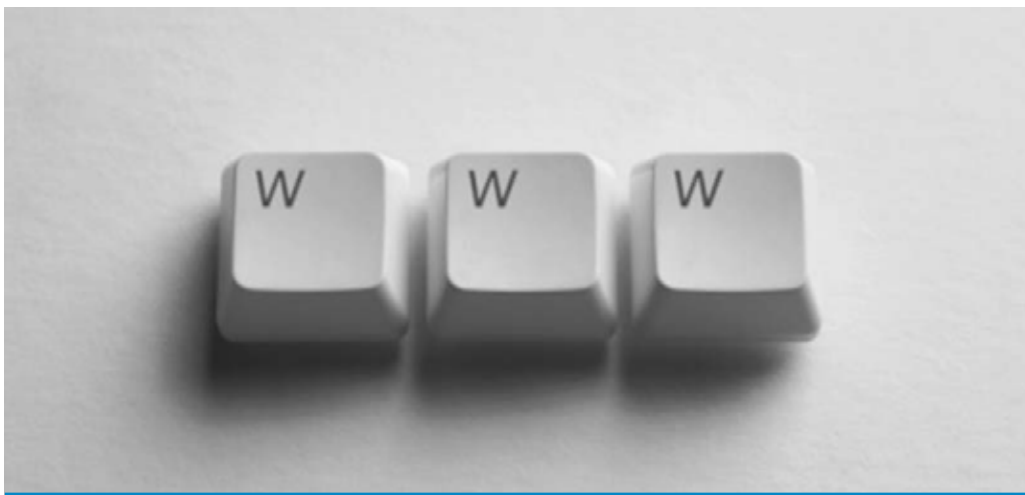
It is important to make sure that all **printed or written information** (brochures, dossiers, PowerPoint presentations, CD ROMs, etc) that may be handed out or explained during the event follows the requirements stipulated in the section titled “printed documentation” and the requirements below:

- Consider the possibility of audio translation of the written texts using audio cassettes, MP3s, etc.
- Have audio guides with audio descriptions. Currently there are audio guides on the market that enable you to enter text and even insert videos into the content using a sign language interpreter.
- Light colored letters with a dark background is recommended for all digital presentations (like PowerPoint presentations).
- At events that are exhibits or visual shows you can organize coordinated guided visits with interpreters or whisperers.

Promoting and publishing the event

When promoting and publishing events, it is important to indicate if they are totally or partially accessible. Whether they are printed materials (cards, brochures, advertisements in the press, posters, etc.) or promoted via verbal communication.

- If the event is adapted, you must indicate it with symbols:
 - That are widely used if the activity is adapted.
 - If there is an alternative communication system for deaf and blind persons.
- At exhibit type events, you must announce the possibility of guided visits upon prior request.
- If the event requires a **registration form**, it must also be adapted and should be explicitly requested for adaptation needs and accessibility systems.
- You should adhere to the size and font type recommendations for written communication as much as possible.
- If the event is promoted on **websites**, they should fulfill the international guidelines for internet accessibility (AAA recommended accessibility level, Triple A).



Promotional activities

Promotions should be designed as a fully accessible event for persons with disabilities and/or elderly persons and/or persons with temporary reduced mobility.

Trade shows, conferences, and promotions

If you have a stand at a trade show, conference or promotion, we recommend you take the following actions:

- The inside of the stand must be accessible to persons who have difficulty walking and wheelchair users, facilitating access with flat footpaths or ramps.
- It shall also be accessible to persons with serious sensory disabilities (vision and hearing). So, it shall have a projection room equipped with a magnetic loop (for persons with hearing limitations that use hearing aids) where different groups of visitors can view a subtitled video.
- In addition, the customer service staff shall know sign language and have good enunciation in order to communicate easily with deaf persons. They shall also be prepared to provide information to persons with learning difficulties.
- Likewise, all of the audiovisual presentations shall be subtitled and information in Braille should be available.

The company's website shall adhere to international accessibility requirements.



Media

The different media (television, radio, and written press) shall be informed of the accessibility measures adopted in order to get to know the services offered and activities promoted in depth by means of a practical sample of actions that include the possibilities of removing the physical and communication barriers of persons with disabilities via:

- Reports on reduced mobility where other elements and adaptations are presented such as tactile maps for blind persons, copies of display items, and audio cassettes.
- Reports on the simultaneous remote subtitling system, audio guides, and audio description.
- Daily newspaper articles making direct reference to disabilities.
- Radio interviews.

Publications and documentation

A brochure explaining the different services available to persons with disabilities will be published. This document will be sent to all of the most representative public administrations, associations and organizations linked to the field of disabilities in Spain.

In order to improve orientation for persons with visual disabilities, a raised map of the company shall be printed with number codes for the areas, accompanied by an activity guide in Braille.

The company's corporate information shall also be published in Braille.

Some recommendations:

- Offer a digital version of the CATALOGS on CD or DVD with the same written content in web format. Have a text only version on the CD and a digital audio version (MP3).
- It would be good for there to be an appendix to the catalogs on paper that contained easy to understand texts using simple vocabulary and reduced grammar for persons with mental or comprehension difficulties.
- A certain percentage of the catalog should be in Braille in order to distribute it to different associations for the blind and visually impaired and/or individuals with visual disabilities.

Conferences

The speaker tables, platforms, stages, and other performance areas shall be accessible via gradually sloped ramps with a 6% recommended slope.

If the speaker has a **lectern** then the height should be adjustable.

In areas where oral communication is the preferred means of communication there shall be alternative communication available for deaf persons (human and technical resources).

In conference rooms there shall be a remote stenography service available (system that enables real time transcription of lectures to text using a computer). Likewise, this system can be used via telephone. The stenographer

receives an audio signal and sends the text via modem. The text appears on the screen as subtitles (two or three lines) in Spanish or English and is simultaneously projected with the image of the speaker.

Subtitling shall also be accompanied by sign language interpretation in the discussed areas.

Persons with hearing disabilities shall be provided with FM transmitters and magnetic loops to increase hearing as additional services to those mentioned above.

Reserve the front rows for persons with disabilities and their companions in areas that are clearly identifiable, marked with the international handicap symbol and, if possible, with different colored seats than the rest.

Detailed Accessibility Measures:

Sign language interpreter

Even if a subtitling service is available, you should choose to use sign language during the event, thus recognizing existing diversity among persons with hearing disabilities: those who communicate orally and those who communicate using signs.

The interpreters must have access to the information prior to the conferences so that they can prepare their interpretation.



Subtitling screen

Check the fonts, font size, and color contrast.

0.72

0.52

0.48

Simultaneous translation

Sign language translation will be provided to deaf persons in all of the areas where speaking is relevant.

The remote subtitling service shall provide subtitling using stenography.



Magnetic loop

The conference rooms shall have an area that is equipped with a magnetic loop which is properly indicated.

FM transmitters

These are used to increase the hearing of persons with hearing aids.

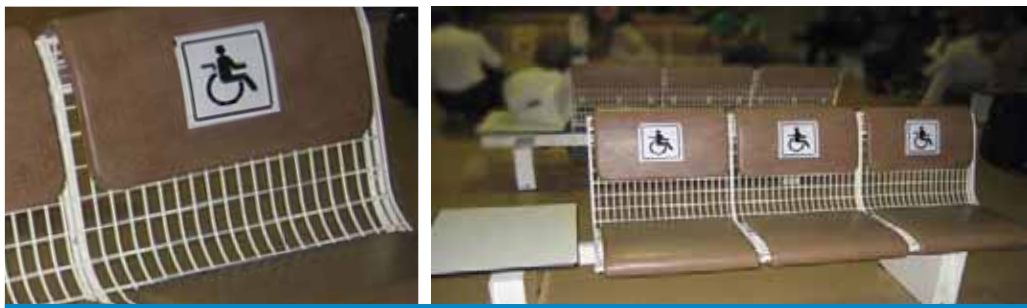
Personalized speaker/listener with disability service. There shall be 10 FM transmitters and 20 receivers that will provide accessibility in communication.

Public address system

All public address messages must appear in text format on the LED screens.

Reserved spaces

There should be reserved spaces that are conveniently marked at all public events for persons with disabilities and their companions. The front rows should be reserved for this purpose (deaf persons sit in front of the sign language interpreter).



The seats should be colored differently than the rest so that they are easily distinguished by everyone.

Training personnel

It is necessary to provide personnel training courses to improve the treatment of persons with disabilities. Even then, **the general recommendations for how to treat** or attend to persons with special needs due to mobility or communication circumstances are:

- Consider these persons the same as everyone else, putting yourself in their place in order to understand their particular needs.
- Adopt a positive attitude, seeing the person for who they are and not only their disabilities or limitations.
- At all times avoid making their special needs evident.
- Apply a series of common sense recommendations that the persons' experience and common sense have proven to be efficient. If at any time you have doubts about how to act, do not be afraid to ask the person what he desires or how he would like to be treated.

In this group there are persons with completely different personalities that need to be helped as is true with any other group.

In short, to work with these persons you must put yourself in their place; get to know their limitations, difficulties, needs, expectations, etc... By studying in depth this group's needs, it can be pointed out that frequently persons with reduced mobility or communication difficulties:

- Want to be understood and accepted by others.
- Feel the need to stay in touch with others maybe because social contact is limited for those who have mobility limitations.
- Many feel their most important problem is having to depend on others, their lack of personal independence in certain situations.
- In general, they always feel uncomfortable if they cannot go as unnoticed as they would like.
- Often times they complain about the attitudes people have with them that consider them to be "useless" because they think that it doesn't make sense for them to travel because it would be "difficult" for them to enjoy it.
- Many of them rebel against feelings of compassion, paternalistic attitudes, or displays of pity that discriminate them and, to some degree, offend them.
- Most of them aspire to be treated like everyone else and to have the same life as others. That is possible in a world without physical or mental barriers that enable them to live in equality.

Knowing and having accepted these characteristics and with an open, positive mindset on behalf of the staff, it is only necessary to apply some simple recommendations in order to smoothly and easily assist persons with special mobility or communication needs.

In general, the treatment of persons with special needs is based on a few, simple recommendations that are easy to learn and apply:

Never underestimate them

Let them do as much as they can on their own which, in most cases, is quite a bit. They like doing things on their own.

Do not help them without asking first

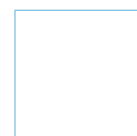
You must very naturally ask them if they would like assistance and what type of assistance they would like and then, logically, wait for the answer. Nobody should be offended if the assistance is offered and not accepted. When it is accepted, discretely assist them without attracting the attention of those around you. Do not be in a hurry and do not cause a commotion. You should never "brag" about helping, nor should you make yourself out to be a "super protector".

You must act naturally in situations of personal contact. What they usually want is to be treated like everyone else. Most of all, try to:

- Not feel uncomfortable talking to them, show concern or excessive zeal.
- Not make any sympathetic statements regarding their condition.
- If necessary, speak about their abilities naturally.
- Do not fall into a tense state of silence or an inappropriate verbal explosion.
- Do not treat them like "children" but rather as any other person their age, they are surprised by this behavior and it could bother them.
- Do not advise them unless they ask. In general, they know exactly what they need and want and can show it in one way or another.
- Do not address their companions unless they cannot communicate on their own.
- Show understanding and tolerance towards possible oversensitivity. Think that this is done daily with every other customer. It is natural in certain situations for a person to be unhappy if their needs and expectations are not met.

Specific recommendations on how to treat persons with special needs

These are simple guidelines that, in many cases, are dictated by logic and common sense. They are applicable in practically every situation that could arise from information and marketing products to providing transportation services.



How to treat persons with physical disabilities

Persons with walking disabilities

Persons who have difficulties walking appreciate it when you adjust your gait to theirs in length and speed, when you protect them in moving crowds, when you offer to help them get up or down stairs or get in and out of vehicles, when you carry bags and luggage for them, and when they are offered a seat so they don't have to stand up for a long time.

When it comes to persons who use a cane or crutches, you must not forget that these "technical aids" are very important to those who use them and they should never be far from them because without them they cannot get around independently.

Because they have difficulties getting around, you should not make them walk more than they have to. For example, the best thing would be to put them at a table that is close to the exit in a dining hall, or if they are staying at a hotel, give them the room that is closest to the elevators and stairs so they do not have to walk down long hallways. This will make it easier for them to enter and exit the facilities, including in safety situations when the building has to be evacuated.

Wheelchair users

As was previously indicated, wheelchair users frequently run into a series of urban, architectural, and transportation barriers that make getting around a real obstacle race.

There are a few basic recommendations regarding how to treat these persons:

- The first is not to get carried away with the image of a wheelchair. Really, you are simply helping a person who is seated.
- To talk to them, just stand in front of them and never behind or in a position that would make them have to turn because it could be difficult for them to do so.
- You must keep a certain distance so that you do not force them to lift their head, and better yet, if you can, kneel down in front of them to be at their level.
- If you push the wheelchair, be careful not to bump into anybody or into any furniture or other objects.
- Push the chair slowly, especially on a slope. Keep in mind that some wheelchair users do not have a good sense of balance and can become panic-stricken when they are pushed too fast.

The practical handling of a wheelchair also has some simple rules:

- The most important one is: to follow the wheelchair user's instructions. He knows best about how to maneuver the wheelchair and how he wants it pushed.
- Do not shake it, accelerate quickly, or make sudden stops. Walk smoothly at an even pace.
- Walk slowly.
- Put the brake on when you stop the chair. At times we do not see the slope of an area and the wheelchair can slide on its own.
- When you need to lift it up or lean on it, only grab the frame or handles that are fixed elements and that don't come off like the arm rests which can be taken off.

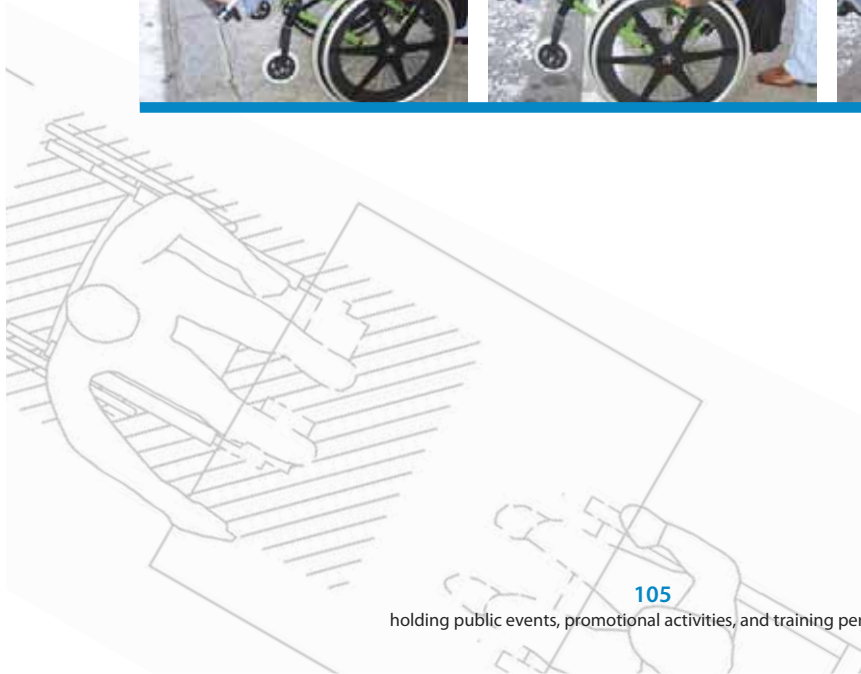
Going up or down one step

If you have to **go up or down a step** or a curb, you should follow some tried and tested guidelines and procedures:

To go up a step or curb you need to push the chair until the small front wheels touch the end of it. Next, tilt the chair backwards by stepping on one of the bars on the back of it and place the front wheels on the step or curb. Wheel the back wheels to the edge of the step or curb and raise the chair lightly and push slowly forward.



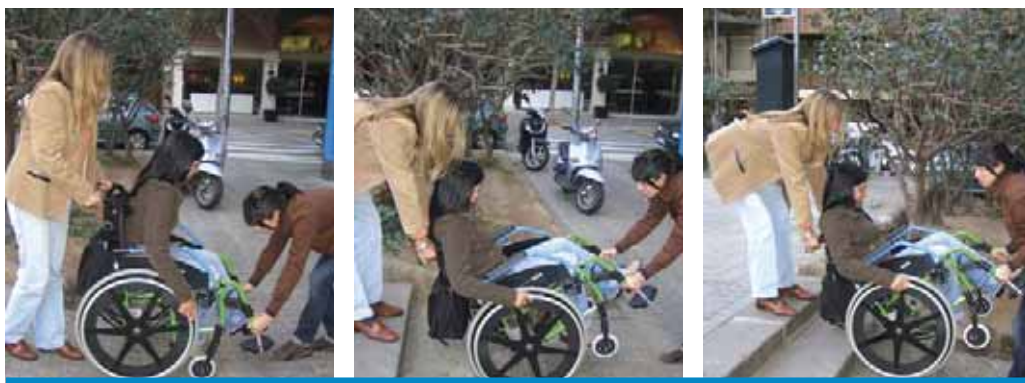
To go down a step or curb, push the chair to the edge and tilt the chair backwards and gently lower the big rear wheels until you get down the step or curb and lightly bring the front wheels down onto the ground.



Going up and down stairs

Going up and down stairs with a wheelchair requires a certain amount of skill for it to be safe and efficient. This maneuver should be done by two companions.

To go up stairs, bring the chair up to the base of the steps backwards until the back wheels are touching the step, gently tilt the chair back and raise it lightly, going up one step at a time. Meanwhile, the other companion grabs the fixed frame of the footrests and helps the chair up.



To go down stairs, proceed as was indicated for going down a curb but holding on tight to the chair on each step you go down.



Persons with disabilities using their hands and arms

This is a fairly important disability depending on the type of situation or activity. In most cases, the disabled person appreciates it when you open a bottle or a door for them or carry things for them.

How to treat persons with visual and hearing disabilities

Persons with visual disabilities

We already mentioned some of the problems blind persons or visually disabled persons can have. Blind persons develop a keen sense of hearing and touch which enables them to carry out all types of complex activities.

A peculiar case is when a person still has part of their vision. Frequently, we do not notice this deficiency and thus we don't notice them, but they are subject to serious risks of having an accident. You practically have to apply the same recommendations of how to treat blind persons to these persons.

Relationships and contact with blind persons are not difficult if you follow the practical guidelines below:

- Identify yourself by first saying who is speaking to them. They cannot recognize someone they do not see unless they know their voice from previous contact.
- When they are offered something, you must identify what they are being given and where it is located within their reach if it is on a table or counter.
- When you get to a place that is unknown to them or when they are accompanied walking down the street, offer them your arm to lean on. Never take their arm and "drag them" or "push them" along. Walk at their side just slightly ahead of them. A half a step should do. And you should only walk in front of them in narrow areas such as a door in order to go through first.
- When accompanying a blind person, you must inform them of possible obstacles, stairs, etc. in their path of travel at all times and indicate to them where you are or how you get to where you are.
- Sometimes without realizing it, you are tempted to talk to them louder in order to better communicate something but you don't need to yell at them.
- Never leave them alone without telling them. They might still think they are being accompanied and continue talking to no one.
- If they get disoriented walking by themselves, just tell them where they are, what is around them and with that they will be able to situate themselves.
- You shouldn't be their "super protector". You shouldn't walk behind them "in case they need help". They can sense it and feel uncomfortable.
- To help them get in or out of public transportation (buses, trains, tramways) just put their hand on the handrail or banister and tell them how many steps they have in front of them.
- If they have to get into an automobile, just tell them where the front and rear of the vehicle are. Then, place their hand on the upper part of the open door. That should be sufficient. They can do the rest on their own.
- To offer them a seat, put their hand on the seatback or the armrest, informing them of their position with respect to the seat and they will sit down on their own.
- During meals, you should indicate to them the position of the plates, glasses, silverware, and location of the food on the plate. One way of doing it is to take the blind person's hand and bring it to each object on the table so that they

can recognize it and use it. Generally you only need to tell them how objects and food are positioned so they can eat independently. Another solution is to tell them the position clockwise, indicating that “the meat is at three o’clock and garnish at nine o’clock” for example.

- It is essential not to change the location of objects that are part of a blind person’s regular environment without telling them beforehand.
- A blind person and his guide dog form a really close team. You should not distract the animal from his task.

Persons with hearing disabilities

Most deaf people nowadays can speak. They miss certain nuances and the accent and volume of how they speak may sound strange or rough, but they can express themselves in common language.

When it comes to how to treat them, they can be broken down into two groups: profoundly deaf persons and persons with hearing loss at a level that is below what is considered normal.

Some frequent characteristics of the **first group**, profoundly deaf persons, are:

- Most of them use sign language to communicate and some of them know how to read lips. However, persons who became deaf after having learned how to talk, post-lingual deaf persons, don’t usually know sign language.
- Sometimes, they need a sign language interpreter if they are going to participate in a meeting or simply to ensure that communication is reliable and smooth.
- They generally have difficulties expressing themselves verbally as we pointed out before (volume, accent, etc) and there are even some who don’t want to express themselves in certain situations.
- Their disability is not visible and many times they go unnoticed and are treated as if they didn’t have one.

There are certain rules on how to treat deaf persons when it is impossible to have an interpreter:

- The most important thing is the attitude that you show at all times, showing an interest in making it easy for them to communicate.
- Use a normal tone of voice.
- Speak normally, not too fast, not too slow so that if they can read lips, they can follow what is being said. This means the face of the person speaking must be illuminated and nothing in front of it. You also need to remember that they will only read lips if they can see them at all times. So it is important to keep constant visual contact.
- It is best to use short, grammatically correct sentences.
- It is important to enunciate well without exaggerating and making unnecessary facial expressions.
- You can be expressive but you don’t need to excessively make faces because it could seem ridiculous or bother a deaf person.
- If the information is not understood, you must choose simpler words and repeat them as many times as necessary.

- In meetings or in groups, such as on a guided tour, you should try to get them to participate by explaining things to them or giving them written notes so that they do not feel isolated.
- They can always refer to the written information when communication is not sufficiently clear or there are doubts about whether something was understood.
- It is essential to have visual warning and alarm systems that are specifically designed for emergency situations.

The second group is made up of persons with hearing problems or hearing loss which covers a wide variety of people from those who can hear almost normally with a hearing aid to those who cannot hear high-pitched sounds or low sounds or don't hear practically anything at all.

The general characteristics of this group are:

- They use technical aids more often which enable them to hear and communicate. We are referring not only to hearing aids but magnetic loops, lighted informational panels, screens, video, etc.
- Relatively few know and use sign language and only some of them read lips.
- Sometimes they don't even show their disability because they avoid asking again when they didn't hear.

Generally many of the recommendations indicated for communicating with deaf persons are applicable in how to properly treat persons with hearing disabilities. However, it is a good idea to:

- Compensate for their hearing difficulties in situations where there is loud background noise: a room with a lot of echo, a crowded station, etc.
- Avoid talking to various people at one time as much as possible in order to maintain proper attention.
- Make sure they properly understood the instructions given.
- Use all of the technical aids that are recommended which are explained below.



How to treat persons with comprehension limitations

The most common characteristic of this group of people is that many of them need to relate to their surroundings and need contact with everyone else.

The practical recommendations for how to treat persons with comprehension limitations are:

- Be natural in how you talk. Speak simply, using common words.
- Always answer their questions, showing interest in understanding their response. Be patient.
- Except for intellectual matters, treat them according to their age even if their mental development does not correspond to the physical age.
- You should not talk about their disability in front of them nor ask them about it because it could hurt their feelings.
- Limit your help to only what is necessary. You must try to let them manage on their own.
- When using transportation or on trips, help them find their destination and help them orient themselves if they get lost.
- If they don't know how to read or have speech difficulties, be patient and explain what they need to them.

How to treat persons that have other disabilities

In addition to the disabilities that we have mentioned above, there is another large group which include neurological disabilities, others that are caused by different illnesses like rheumatism or by some chronic illnesses like diabetes, hemophilia, asthma, heart conditions, etc.

Among those that are cerebral there is **epilepsy** which is invisible, can be medically controlled, and only manifests itself sporadically by means of convulsions, and **autism** where the person becomes locked in their own world, rejecting contacts and interferences from their environment. You must also keep in mind **mental illnesses** (phobias, neurosis, psychosis...) that can equally cause comprehension and communication difficulties.

Persons with cerebral paralysis have language and mobility problems depending on the part of the brain that has been affected. These are persons that are frequently thought to have cognitive disabilities because of their appearance or by the way they speak and are treated inappropriately.

Logically, all disabilities are different and you must adapt to each specific case in order to treat them properly. However, in summary of all of the aforementioned, we can summarize the practical recommendations for how to treat any person that has special needs due to reduced mobility or communication in the following manner:

- Always ask the person what their special needs are which is most practical.
- Put yourself in the person's place so that you can understand their needs.
- Act natural.
- Maintain an attitude of respect towards the person.
- Use common sense in any situation that may arise.

bibliography

“Manual de accesibilidad integral para las edificaciones administrativas adscritas a la Administración General del Estado”.

<http://www.mtas.es/inicioas/accesibilidad.htm>

“Guía de accesibilidad para discapacitados en sitios web”.

Comité de Normas para el documento electrónico.

“¡Pregúntame sobre accesibilidad y ayudas técnicas!”.

<http://www.mtas.es/inicioas/accesibilidad.htm>

“Guía de buenas prácticas en accesibilidad a entornos de trabajo”.

Fundosa Accesibilidad S.A.

www.Fundacionkonecta.org

“Libro blanco de la accesibilidad”.

Enrique Rovira-Beleta Cuyás. Ediciones UPC.

www.rovira-beleta.com

“Accessibilitat a l'edificació i l'urbanisme”.

Enrique Rovira-Beleta Cuyás. Ediciones UPC.

www.rovira-beleta.com

“Accesibilidad para personas con ceguera y deficiencia visual”.

ONCE. Organización Nacional de Ciegos Españoles.

Dirección General. Dirección de autonomía personal y bienestar social.

“Accesibilidad para personas sordas.

Recopilación de barreras de comunicación y sus soluciones”.

ACAPPS - Asociación Catalana para la Promoción de las Personas Sordas.

FESOCA - Federación de Sordos de Cataluña.

“Curso básico sobre accesibilidad (con seguridad) del medio físico”.

Documentos 15/99.

Ministerio de Trabajo y Asuntos Sociales.

Real Patronato sobre Discapacidad.



“Manual de accesibilidad”.

Ministerio de Asuntos Sociales.

Instituto Nacional de Servicios Sociales.

Centro Estatal de Autonomía Personal y Ayudas Técnicas - CEAPAT.

“Comunicación para todos. Pautas para la comunicación accesible”.

Telefónica.

“Libro verde. La accesibilidad en España. Diagnóstico y bases para un plan integral de supresión de barreras”.

Instituto Universitario de Estudios Europeos.

Universidad Autónoma de Barcelona-Observatorio de la discapacidad.

Ministerio de Trabajo y Asuntos Sociales.

Secretaría General de Asuntos Sociales.

Instituto de Migraciones y Servicios Sociales (IMSERSO).

Boletines del Centro Estatal de Autonomía Personal y Ayudas Técnicas – CEAPAT.

Ministerio de Trabajo y Asuntos Sociales.

Secretaría de Estado de Servicios Sociales Familias y Discapacidad.

Instituto de Migraciones y Servicios Sociales (IMSERSO).

(Números del 50 al 57).

Revista Foment del treball nacional.

Nº 2109 2005/3.

“La Inserción laboral de personas discapacitadas”.

Cristian Rovira Pardo. Consejero Delegado. Grupo SIFU.

Infocet- Boletín Digital nº 109 6/2008.

Información Centros Especiales de Empleo y Trabajadores con Discapacidad.

Pedro Tuset del Pino. Director.

Adaptabilitat de caixers automàtics per a persones discapacitades.

Proposta de Normalització. Departament d’Estudis. Fundació Barcelona Digital.

Regulations

Significant State Regulations

Order PRE/446/2008, of the 20th of February, that stipulates the specifications and technical characteristics of the conditions and criteria of accessibility and non-discrimination established in royal decree 366/2007, of the 16th of March.

Law 56/2007, of the 28th of December, on Stimulus Measures of the Information Society.

Royal Decree 1544/2007, of the 23rd of November which regulates basic accessibility conditions and non-discrimination for the access and use of transportation means for persons with disabilities.

Law 27/2007, of the 23rd of October wherein the Spanish sign languages are recognized and support means for oral communication of deaf persons, persons with hearing disabilities, and deaf and blind persons are regulated.

Royal Decree 314/2006, of the 17th of March that approves the "Technical Building Code".

Law 10/2005, of the 14th of June, on urgent measures for the promotion of DTV, whose Additional Provision 2 guarantees accessibility of DTV to persons with disabilities.

Royal Decree 364/2005, of the 8th of April that regulates the exceptional alternative fulfillment of the quota in favor of employees with disabilities.

"I National Accessibility Plan 2004-2012". Ministry of Social Affairs. General Secretariat of Social Affairs. Institute of Migrations and Social Services (IMSERSO). Approved by the Board of Ministers on July 25, 2003.

Law 51/2003, of the 2nd of December regarding equal opportunities and non-discrimination of persons with disabilities.

Royal Decree 27/2000, of the 14th of January, that establishes exceptional alternative fulfillment measures of the two percent quota in favor of employees with disabilities at companies with 50 or more employees.

Law 13/1982, of the 7th of April on Social Integration of Handicapped Individuals.

"Compared analysis of the autonomous and state accessibility regulations". Documents 47/2005 Department of Labor and Social Affairs. Royal Patronage on Disabilities.

AENOR Technical Regulations

UNE 139804:2007. "Guidance on the use of the Spanish Sign Language on computer networks".

UNE 158401:2007. "Services for the promotion of the personal autonomy. Management of the telecare service. Requirements".

UNE 170001-1:2007. "Universal accessibility. Part 1: DALCO criteria to facilitate accessibility to the environment".

UNE 170001-2:2007. "Universal accessibility. Part 2: Accessibility management system".

AEN/CTN 153. "Regarding technical aids. Subtitling for deaf persons or persons with hearing deficiencies".

UNE 153020:2005. "Audio description for visually impaired people. Guidelines for audio description procedures and for the preparation of audio guides".

UNE 139803:2004. "Web content accessibility requirements".

UNE 139801: 2003. "Computer accessibility requirements: Hardware".

UNE 139802:2003. "Computer accessibility requirements: Software".

UNE 153019:2003. "Subtitling for deaf and hard-of-hearing people. Subtitling by teletext".

UNE 66929:2003. "Quality management systems. Guide for the application of the UNE-EN ISO 9001:2000 standard to legal, economical and/or fiscal professional offices".

UNE 41501:2002. "Symbol of accessibility for mobility. Rules and grades of use".

UNE 41520:2002. "Accessibility in building. Horizontal communications elements".

UNE 41510:2001. "Accessibility in the urbanism".

UNE PNE 41511. "Accessibility in parks and gardens".

UNE 41512:2001. "Accessibility in beaches and its environs".

UNE 41513. "Accessible urban itineraries in case of urban works".

UNE 41521. "Accessibility in building. Vertical communications elements".

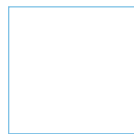
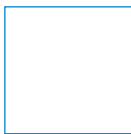
UNE 41522:2001. "Accessibility in building. Accesses to the buildings".

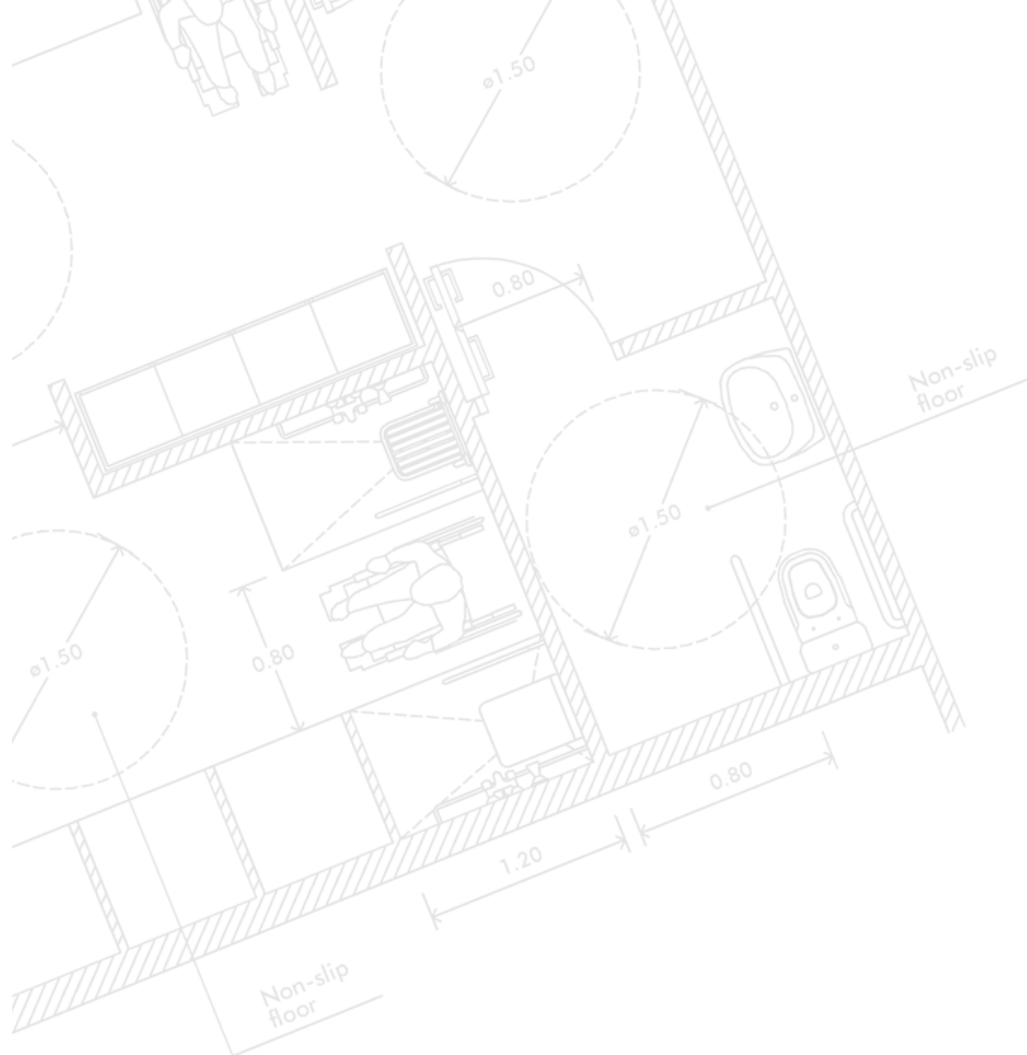
UNE 41523:2001. "Accessibility in building. Sanitary spaces".

UNE 41500 IN: 2001. "Accessibility in building and urbanism. Design general criteria".

UNE-EN ISO 9001:2000. "Quality management systems. Requirements".

UNE-EN ISO 9999:1999. "Assistive products for persons with disability. Classification".





Club de Excelencia en Sostenibilidad
 Serrano 93, 7ºA
 28006 Madrid
 Tel: (+34) 91-782-0858
 Fax: (+34) 91-564-6967
www.club sostenibilidad.org
www.responsabilidadimas.org