
**Building construction — Accessibility
and usability of the built environment**

Cadre bâti — Accessibilité et usage de l'environnement bâti

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ISO 21542:2021

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 59, *Buildings and civil engineering works*, Subcommittee SC 16, *Accessibility and usability of the built environment*.

This second edition cancels and replaces the first edition (ISO 21542:2011), which has been technically revised.

The main changes compared to the previous edition are as follows:

- a) document structure: a new hierarchy level has been introduced and the clauses have been assigned accordingly and partly resorted (e.g. [Clause 5](#));
- b) editorial revision of the Introduction and the Scope;
- c) modification of the approach of exceptional considerations, which now only apply to existing buildings;
- d) update of the normative references throughout the document;
- e) revision of [Clause 3](#) on terms and definitions according to the terminology used in the document and update of the sources;
- f) restructuring of several (sub)clauses, especially those on:
 - orientation and information ([5.1](#));
 - lighting ([5.4](#));
 - acoustics ([5.7](#));
 - paths to the building ([6.3](#));
 - building entrances and final fire exits ([6.5](#));
 - vertical and inclined lifting platforms ([8.6](#));

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- doorsets and windows ([9.1](#));
 - rooms and space within non-domestic buildings ([Clause 10](#));
- g) the provisions regarding tactile walking surface indicators (TWSI) have been adapted:
- ISO 23599:2019 has been widely referenced;
 - a new subclause on tactile walking surface indicators has been introduced to [5.1](#);
 - the annex on tactile walking surface indicators was revised and shortened;
- h) revision of the provisions regarding visual contrast:
- the specifications in [5.3](#) have been revised and the relevant design factors were moved from the annex on human abilities and associated design considerations to it;
 - a separate annex for the determination of the luminance contrast has been created;
- i) complete revision and enlargement of the specifications on acoustics in [5.7](#) and emergency warning systems, signals and information in [5.8](#);
- j) clarification and enlargement of the specifications on solitary obstacles in a path in [6.3.8](#);
- k) complete revision of [6.4](#) on ramps and [8.5](#) on lifts;
- l) enlargement of the specifications on control devices and signals ([9.2](#)) and drinking fountains ([9.2.9](#));
- m) revision of the clauses related to (fire) emergency evacuation:
- merger of the specifications related to (fire) emergency evacuation in [Clause 11](#) but keeping the specifications on emergency warning systems in [5.8](#), on lifts used for evacuation in [8.5.8](#) and on fire-resisting doorsets [9.1.2](#);
 - introduction of a subclause on emergency evacuation related building infrastructure;
 - complete revision of the annex on fire prevention, protection, safety and evacuation ([Annex D](#));
- n) introduction of a new informative annex on housing ([Annex A](#));
- o) editorial revision of existing figures, removal of redundant figures and provision of new figures;
- p) update of the Bibliography including the removal of national standards.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

This document provides essential requirements and necessary recommendations for the realization of a safe, inclusive, age-friendly and sustainable built environment that is accessible and usable by all.

The purpose of this document is to describe how a building should be designed, constructed, managed and maintained in order to enable people to: approach and enter the building; use the building's facilities, services and information networks; egress from the building under normal conditions; and evacuate the building during an emergency.

Accessibility and usability for all is a dynamic and continuously evolving concept – a fundamental attribute of a sustainable built environment. It is a process of interlinked actions and tasks in the everyday lives of people, which enables them to be educated, to get a job, to participate fully in a community, and to feel socially included. Just one barrier, physical or otherwise, to that participation can restrict, terminate and make void the whole process.

The intention of this document is to meet the needs of the broadest majority of people. This goal is achieved by agreement on minimum standards of provision that are generally accepted to accommodate human diversity and variation, in age, ability, and behaviour, common in every society.

When the infrastructure of accessibility and usability is fully and effectively in place, good building management practice and procedures are essential to maintain original as-built or as-adapted performance during the life cycle of the building and, in the event of a fire or other emergency incidents, to ensure that the intended safety strategy is successfully initiated and executed.

The principles of accessibility and usability for all are supported by Preamble Paragraph (g), and Articles 9, 10, 11, 12 and 19 of the United Nations (UN) Convention on the Rights of Persons with Disabilities. These principles are reinforced by

- the UN 2015-2030 Sustainable Development Framework Agenda, particularly Sustainable Development Goal 11: Sustainable Cities & Communities;
<https://sdgs.un.org/content/dam/development-desa/disabilities/convention-on-the-rights-of-persons-with-disabilities.html>
- the World Health Organization's 2016-2020 Global Strategy & Action Plan on Ageing & Health.

NOTE 1 The United Nations Convention on the Rights of Persons with Disabilities (CRPD), with its Optional Protocol, was adopted by the General Assembly on 13 December 2006. It came into force, i.e. it became an international legal instrument, on 3 May 2008. Full information can be found on the UN website: <https://www.un.org/development/desa/disabilities/convention-on-the-rights-of-persons-with-disabilities.html>.

NOTE 2 Protection of persons with disabilities during severe natural events, e.g. earthquakes, floods, landslides, typhoons and tsunamis, is dealt with under the Sendai Framework on Disaster Risk Reduction (2015 - 2030), which forms part of the UN Sustainable Development Framework Agenda.

If the design requirements and recommendations in this document are taken into consideration during the earliest stages of a new building design, the financial cost of providing accessibility and usability measures is minimal, and the completed building is safer and more user-friendly for every building user. For all existing buildings, effort should be made to meet the requirements to make them accessible and usable. It is also important to ensure that buildings of historical, architectural and cultural importance are accessible.

Where these design requirements are not considered, the socio-economic cost is considerable in terms of human rights violations and a significant reduction in building user safety and satisfaction.

ISO/IEC Guide 71, and its guidance document ISO/TR 22411, augment and assist in understanding the requirements of this document.

At present, consideration is being given to the development of further documents to especially deal with environments for children with disabilities and cultural heritage.

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Building construction — Accessibility and usability of the built environment

IMPORTANT — The electronic file of this document contains colours which are considered to be useful for the correct understanding of the document. Users should therefore consider printing this document using a colour printer.

1 Scope

This document specifies a range of requirements and recommendations for the elements of construction, building assemblies, components, fittings and products that relate to the design and constructional aspects of usability and accessibility of buildings, i.e. access to buildings, circulation within buildings, egress from buildings during normal conditions, and evacuation in the event of a fire.

This document also applies to the common spaces in multi-unit residential buildings. Recommendations regarding residential units are given in [Annex A](#).

This document also contains provisions with respect to outdoor features directly concerned with access to a building or a group of buildings from a relevant site boundary, or between such a group of buildings within a common site. This document does not deal with elements of the external environment, such as public open spaces, whose function is self-contained and unrelated to the use of a specific building.

This document is applicable to new buildings and new work in existing buildings.

This document introduces the concept of 'exceptional considerations for existing buildings' for situations where it is exceptionally difficult to meet the requirements specified and, thus, impossible to provide full accessibility. By means of 'exceptional considerations for existing buildings', an acceptable, though restricted, level of accessibility is specified. An exceptional consideration for existing buildings is not to be applied in other situations or invoked in an unjustified manner, or as an excuse for not achieving a higher level of accessibility, where this is economically and/or technically feasible.

The dimensions stated in this document, relevant to the use of wheelchairs, are related to the footprint of commonly used wheelchair sizes and users as specified in ISO 7176-5 and ISO/TR 13570-2, 800 mm wide and 1 300 mm long.

This document is primarily written for adults with disabilities, but it includes some recommendations on specific accessibility needs of children.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC Guide 71, *Guide for addressing accessibility in standards*

ISO 4190-5:2006, *Lift (Elevator) installation — Part 5: Control devices, signals and additional fittings*

ISO 8100-1:2019, *Lifts for the transport of persons and goods — Part 1: Safety rules for the construction and installation of passenger and goods passenger lifts*

ISO 8100-30:2019, *Lifts for the transport of persons and goods — Part 30: Class I, II, III and VI lifts installation*

ISO 9386-1, *Power-operated lifting platforms for persons with impaired mobility — Rules for safety, dimensions and functional operation — Part 1: Vertical lifting platforms*

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ISO 9386-2, *Power-operated lifting platforms for persons with impaired mobility — Rules for safety, dimensions and functional operation — Part 2: Powered stairlifts for seated, standing and wheelchair users moving in an inclined plane*

ISO 23599:2019, *Assistive products for blind and vision-impaired persons — Tactile walking surface indicators*

IEC 60118-4, *Electroacoustics — Hearing aids — Part 4: Induction-loop systems for hearing aid purposes – System performance requirements*

IEC 60268-16, *Sound system equipment — Part 16: Objective rating of speech intelligibility by speech transmission index*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC Guide 71 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

3.1 accessibility

provision of buildings or parts of buildings for people, regardless of their age, size, ability or disability, to be able to gain access to them, into them, to use them and exit from them

Note 1 to entry: Accessibility includes ease of independent approach, entry, evacuation and/or use of a building and its services and facilities, by all of the building's potential users with an assurance of individual health, safety and welfare during the course of those activities.

3.2 area of rescue assistance

area of refuge

building space that has been designed for people to temporarily wait in safety and with confidence for further information, instructions, and evacuation assistance or rescue, without obstructing or interfering with the evacuation of others

3.3 attention pattern

TWSI (3.33) design, calling attention to a hazard only, or to hazards and decision points

[SOURCE: ISO 23599:2019, 3.1, modified — Note 1 to entry has been removed.]

3.4 built environment

external and internal environments and any element, component or fitting that is commissioned, designed, constructed and managed for use by people

Note 1 to entry: Loose items are excluded because decisions with respect to their location within the built environment are more likely to be under the day-to-day control of facilities managers and not of those who commission, design or construct the built environment.

3.5 circulation space

unobstructed space necessary for access to, into and within and egress from any part of the *built environment* (3.4)

3.6**counterflow**

emergency access by firefighters or rescue teams into a building and towards a fire, while building users are still moving away from the fire and being evacuated from the building

3.7**doorset**

assembly consisting of a fixed part (door frame), one or more movable parts (door leaves), and their door furniture, the function of which is to allow or to prevent access and egress to a room or a building

Note 1 to entry: A doorset can also include, at floor level, a door saddle (also known as a sill or threshold).

3.8**fire compartment**

enclosed space, which may be subdivided, separated from adjoining spaces by fire barriers

[SOURCE: ISO 13943:2017, 3.120]

3.9**fire emergency management plan**

description of the fire emergency response procedures for an occupied building with the aim of ensuring the safety and health of all building users in the event of a fire emergency

Note 1 to entry: It includes information about the building's fire safety preparedness and prevention measures, the pre-emergency, emergency and post-emergency roles, duties and responsibilities assigned to building management personnel.

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3.10**fire evacuation**

planned and orderly phased movements to withdraw, or cause to withdraw, all users from a building via accessible routes to one or more accessible places of safety (3.20) in the event of a fire emergency

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3.11**going**

tread

tread depth

<stair> horizontal distance between two consecutive nosings

3.12**guiding pattern**

TWSI (3.33) design, indicating a direction of travel or a landmark

[SOURCE: ISO 23599:2019, 3.8, modified — Note 1 to entry has been removed.]

3.13**handrail**

component providing support and grip for users

[SOURCE: ISO 6707-1:2020, 3.3.2.75]

3.14**hearing enhancement system**

piece of equipment, product system, hardware, software or service that is used to increase, maintain or improve hearing capabilities of individuals with *hearing impairments* (3.15)

Note 1 to entry: Hearing enhancement systems amplify audible communication and can be helpful to people who have hearing loss. They include a direct wire system, an *induction loop* (3.17) system, an infrared system, or a radio frequency system. All of these systems transmit a signal. Special-purpose receivers are required for infrared and radio frequency systems, while hearing aids equipped with a T-switch can receive the signal from an induction loop system. Receivers can be equipped to be compatible with hearing aids.

3.15

hearing impairment

acoustic *perception* (3.27) ranging from hard of hearing to deafness

Note 1 to entry: “Deaf” refers to having little or no functional hearing, while “hard of hearing” refers to having a hearing loss that ranges from mild to profound.

3.16

impairment

limitation in body function or structure such as a significant deviation or loss which can be temporary or permanent, slight or severe and can fluctuate over time

3.17

induction loop

system that transmits an audio signal directly to a hearing aid

Note 1 to entry: The audio signal is transmitted via a magnetic field, greatly reducing background noise, competing sounds, reverberation and other acoustic distortions in order to improve the clarity of sound.

Note 2 to entry: IEC 60118-4 provides further information about induction loops for enhanced hearing.

[SOURCE: ISO 22259:2019, 3.20, modified — Note 2 to entry has been added.]

3.18

kerb ramp

construction, in the form of an inclined plane that makes it possible to pass from street level to a higher pedestrian path

3.19

landing

platform or part of a floor at the end of a flight of stairs or ramp or area providing access to a lift car at each level of use

[SOURCE: ISO 6707-1:2020, 3.3.5.23, modified — “of stairs” has been added.]

3.20

levelling accuracy

vertical distance between *lift* (3.21) car sill and *landing* (3.19) sill during loading or unloading of the lift car

[SOURCE: ISO 8100-1:2019, 3.25, modified — “lift” has been added twice.]

3.21

lift

elevator

permanent lifting equipment that serves defined levels of *landings* (3.19), comprising a compartment or cage, running at least partially between rigid vertical guides, or between guides whose inclination to the vertical is less than 15°

[SOURCE: ISO 6707-1:2020, 3.3.4.29]

3.22

lift evacuation system

system, including a vertical series of *lift* (3.21) lobbies and associated lift lobby doors, (a) lift well(s), and machinery spaces, that provides protection from fire effects for lift passengers, people waiting to use lifts, and lift equipment so that lifts can be used safely for egress

Note 1 to entry: This definition is based on NIST TN 1825.

3.23**lifting platform**

appliance permanently installed to serve fixed *landing* (3.19) levels, comprising a guided platform whose dimensions and means of construction permit the access of passenger(s) with disabilities, with or without wheelchair(s)

Note 1 to entry: Lifting platforms can also be portable, e.g. as used in exhibitions. Portable lifting platforms are not covered by ISO 9386-1.

[SOURCE: ISO 9386-1:2000, 3.25, modified — “device” has been replaced by “appliance”; “disabled passenger(s)” has been replaced by “passenger(s) with disabilities”; the original Note 1 to entry has been removed; a new Note 1 to entry has been added.]

3.24**light reflectance value****LRV**

proportion of visible light reflected by a surface, weighted for the sensitivity to light of the human eye

Note 1 to entry: The light reflectance value as used in this document is equivalent to CIE tristimulus Y as defined by CIE 15:2018.

Note 2 to entry: CIE Y10 is evaluated with reference to the standard illuminant CIE D65 and to the geometry dif/8° (diffuse illumination and observation at an angle of 8° by the normal to the sample), according to 10° CIE standard colorimetric observer. Further details on measurements of reflection are given in CIE 130:1998.

Note 3 to entry: The LRV is expressed on a scale of 0 to 100, with a value of 0 points for pure black and a value of 100 points for pure white.

3.25**luminance**

intensity of light emitted or reflected by a surface element in a given direction divided by the area of the element in the same direction

Note 1 to entry: Luminance is given in cd/m^2 .

Note 2 to entry: The intensity of light is the luminous flux per unit solid angle emitted or reflected by a surface element in a given direction. The projected area of the surface element is measured perpendicular to this direction.

3.26**luminance contrast**

luminance (3.25) of one surface or component compared to the luminance of the background or adjoining surface

Note 1 to entry: The luminance contrast as used in this document is determined by the use of the Michelson formula (C_m) or the Weber formula (C_w) and is given in %.

Note 2 to entry: In this document, the equivalent for the required luminance contrast when using the Weber formula (C_w) is given in the tables and in brackets in the text.

3.27**perception**

interpretation of sensory information by the brain and central nervous system with the aim of developing understanding prior to action

Note 1 to entry: Sensory information is of visual, auditory, olfactory, gustatory, tactile or of a proprioceptive nature.