



Federal Ministry for the  
Environment, Nature Conservation,  
Building and Nuclear Safety



# Guideline Accessibility in Building Design

# Imprint

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## Foreword

For far too long, people with disabilities were excluded from a large part of our lives, above all from public life. I am delighted to see how much has changed in this regard. But it is still clear: we are far from having reached our goal. We intend to make it possible for every person with or without disabilities to live autonomously: at home, at work, and in every area of life in our society.

Autonomous living – this aim entails specific requirements for the built environment. As the German Building Minister this topic is very close to my heart. I find it important that the Federal Government set a good example. The Government has committed itself to consistent accessibility in all its construction projects. Accessibility means building without barriers for anyone, including people with motor, visual, auditory, and cognitive impairments. Accessible buildings need to be easy to find, provide barrier-free access, and above all, they need to be easy to use. This applies both to new buildings and to existing ones, including their access routes and outdoor facilities.

This Guideline is intended to serve as a manual for the work of the federal building authorities, developers, planners, and users of other public buildings and workplaces, in other words, for everyone intending to build without barriers. It illustrates what specifically needs to be taken into account in terms of accessibility in building design. By explaining areas of action in detail and describing a reference project, the Guideline shows what integrated planning means and exactly what individual and practicable solutions can look like.



**Dr Barbara Hendricks**

Federal Minister for the Environment, Nature Conservation,  
Building and Nuclear Safety



## Introduction

According to the Federal Statistical Office, there are seven million people with severe disabilities living in Germany, which corresponds to a share of about 8.9% of the entire population. Most of these people are older than 55, one third are even older than 75.

In the light of demographic developments we can expect a continuous increase in the number of people with various types of impairments.

Progress in medicine and the development of technical aids, navigation and communication possibilities will certainly be able to compensate for many impairments, but an accessibly designed environment taking into account the needs of all its users will remain imperative in the future as well. We are already benefitting from implemented accessibility planning and barrier-free building. These need to become second nature.

The Guideline Accessibility in Building Design is tailored to decision-makers, users, the staff of building authorities at Federal and *Länder* levels, and freelance architects, landscape architects, interior designers, and other planners commissioned to construct buildings or outdoor facilities in accordance with the Guidelines for Federal Construction Measures (*Richtlinien für die Durchführung von Bauaufgaben des Bundes*, RBBau).



# The structure of the Guideline

Accessibility planning and barrier-free building are characterised by complexity. This is true not only for their varying areas of use and the related requirements, but also for each phase of the planning procedure. Sometimes several legal standards apply at the same time. At other times they only apply to individual parts of the building. The responsibilities and competences throughout the entire process are not always regulated consistently, instead they may change or lie with several authorities.

The Guideline Accessibility in Building Design outlines the existing basic framework and explains how to integrate accessibility planning and barrier-free building into planning and implementation processes in accordance with the Guidelines for Federal Construction Measures (*Richtlinien für die Durchführung von Bauaufgaben des Bundes*, RBBau). This approach is the basis for the structure of the guideline, which is as follows:

## Part A – Basic framework

A summary of the legal basis illustrates and explains how accessibility planning and barrier-free building are anchored in applicable legislation. The other basic principles and standards described in this section show where accessibility planning and barrier-free building touch upon other specialist disciplines.

## Part B – RBBau Guidelines and accessibility requirements

The Guideline embeds accessibility in building design into the entire procedure from requirements planning to implementation, showing respective responsibilities and levels of involvement. The Guideline defines the minimum contents with regard to accessibility that are required for each step in the planning process.

## Part C – Areas of action

The requirements for accessibility planning and barrier-free building are structured by area of action: depending on the individual building task and the procedural status these can be of varying significance. Moreover, the different areas of action refer to the special needs of people with specific impairments. This part of the Guideline is intended as an aid to structure procedures according to RBBau Guidelines and as a checklist.

The illustrations are pictures of built examples intended as inspiration for the different areas of action. However, it is possible that deviations from the requirements can be found in individual details of the solutions presented.

## Part D – Description of a reference project

The last section uses a fictitious project to illustrate how the Guideline Accessibility in Building Design can be used in the different phases of a procedure according to RBBau Guidelines.



Photo by Jörn Lehmann



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## Legal basis

Accessibility planning and barrier-free building are determined in their complexity by various sets of laws and regulations, e.g., social legislation or building laws as part of public law. The following legal foundations are significant in general terms, though not directly linked to planning and building:

### Basic Law for the Federal Republic of Germany

The basis for accessibility in building design is laid out in Article 3, paragraph 3, sentence 2 of the Basic Law for the Federal Republic of Germany:

“No person shall be disfavoured because of disability.”

### The UN Convention on the Rights of Persons with Disabilities

was adopted by the United Nations on 13 December 2006 and ratified in Germany on 26 March 2009. Article 9 calls for comprehensive accessibility.

“[...] to promote, protect and ensure the full and equal enjoyment of all human rights and fundamental freedoms by all persons with disabilities [...]“ (Article 1 Convention on the Rights of Persons with Disabilities).

The following legal foundations are significant for buildings for which the Federal Government is responsible:

### Act on Equal Opportunities for Persons with Disabilities

The definition of accessibility is based on the Act on Equal Opportunities for Persons with Disabilities (*Behindertengleichstellungsgesetz, BGG*) of 27 April 2002, last amended through Article 12 G of 19 December 2007. Accessibility is described in § 4:

“Buildings and other structures, means of transport, technical devices, information processing systems, acoustic and visual information sources and communications equipment are considered accessible if people with disabilities have access to them and can use them as customary, without particular impediments, and basically without assistance.”

→ The Act on Equal Opportunities for Persons with Disabilities (*Behindertengleichstellungsgesetz, BGG*) does not assign responsibilities. The Federal Government's aim to voluntary commitment is noteworthy.

According to the BGG, generally accepted good engineering practice is to be applied.

This act applies to the federal level – the *Länder* have set up their own equal opportunities laws with differences in some details. According to § 8 on establishing accessibility in the areas of building and transport:

**“[...] non-military buildings to be newly built or subject to major modifications and additions for which the Federal Government is responsible, including federal authorities, institutions, and foundations under public law, need to be designed accessibly in accordance with generally accepted good engineering practice. Deviations are permissible if a different solution fulfils accessibility requirements to the same extent [...]”**

### **Model Building Regulation (*Musterbauordnung*, MBO) and *Länder* Building Regulations**

The Model Building Regulation was developed by the Conference of Building Ministers and serves as the basis for developing *Länder*-specific building regulations. However, in some cases the chapters on accessibility differ significantly in individual *Länder*. This is true, for example, with regard to areas of application and provisions on disproportionate extra expenditure.

The Model Building Regulation 2002, last amended by the decision of the Conference of Building Ministers in 2012, defines accessibility in § 2 under item (9):

**“Structures are considered accessible if people with disabilities have access to them and can use them as customary, without particular impediment, and generally without assistance.”**

Accessibility to those parts of buildings and structures that are generally open to the public and are used for visitor and user traffic are defined in § 50 MBO. A distinction is made between rooms and installations regularly used for their intended purpose that only need to be accessible to the extent required, and toilets and obligatory parking spaces for visitors and users that need to be barrier-free and provided in sufficient numbers:

**§ 50 Accessibility in Building Design (2) “Structures that are publicly accessible must be barrier-free in the sections open to general visitor and user traffic. This applies in particular to 1. buildings offering cultural and educational services, 2. sports and leisure facilities, 3. health service facilities, 4. office, administrative and court buildings, 5. sales,**

→ The architect designing the project is in particular responsible for compliance with those accessibility requirements of the building regulation that apply only to publicly accessible areas of a structure or building.

The building control authority in the context of planning approval or inspection procedures decides on deviations, or, in case of special installations, on facilitations or special requirements.

catering, and hotel facilities, 6. parking spaces, garages, and public toilets. Rooms and installations to be used for their intended purpose only need to be accessible to the extent needed, while accessible toilets and parking spaces for visitors and users need to be provided in sufficient number.”

A definition of so-called disproportionate extra expenditure can be found in § 50 MBO, paragraph (4):

In Berlin, for example, additional costs that exceed 20% of the total costs of a building project are considered disproportionate extra expenditure. (Commentary on Berlin Building Regulation, 2006).

“Paragraphs 1 and 2 do not apply if the requirement cannot be fulfilled without disproportionate expenditure due to difficult terrain, the construction of a lift that would not serve any other purpose, inappropriate structures already built, or regarding the safety of people with disabilities or older people.”

This provision allows for deviations that are particularly necessary for older buildings. It has found its way into the Building Regulations of the *Länder*. No uniform amount has been fixed for what constitutes disproportionate extra expenditure in relation to the total costs of a building project. According to § 51 MBO on special installations

“special requirements may arise depending on the individual case [...]. Facilitations may be permitted so long as legal regulations do not apply due to the special nature or use of the structures or buildings or because of special requirements.”

The requirements and facilitations may also extend to issues of barrier-free usability.

Dimensional requirements in the case of barrier-free lifts are listed under § 39.

### Generally accepted good engineering practice

The Federal Government wishes to advise of the following DIN standards and technical guidelines in constructing accessible buildings as generally accepted good engineering practice (as of February 2014; please check for updates):

DIN: standard by *Deutsches Institut für Normung* (German National Standard)

VDI: standard by *Verband Deutscher Ingenieure* / Association of German Engineers

- DIN 18040-1:2010-10 Construction of Accessible Buildings – Design Principles – Part 1: Publicly Accessible Buildings: these

“[...] apply to new constructions and shall be applied to the planning of modifications and modernisations *mutatis mutandis* [...]”



- DIN 18040-2:2011-09 Construction of Accessible Buildings – Design Principles – Part 2: Dwellings
- DIN 18024-1:1998-01 Barrier-free Built Environment (streets, squares, paths, public transport, recreation areas and play-grounds)
- DIN 18040-3, 05–2013, draft available
- DIN EN 81-70; 2005-09 Safety Rules for the Construction and Installation of Lifts
- DIN 1450:1993-07 Lettering – Legibility
- DIN 18041:2004-05 Acoustical quality in small to medium-sized rooms
- DIN 32975:2009-12 Designing Visual Information in the Public Area for Accessible Use
- DIN 32984:2011-10 Ground Surface Indicators in Public Areas
- DIN 32976 Braille: 2007-08 – Requirements and Dimensions
- DIN Technical Report 124: Products in Design for All (2002)
- DIN Technical Report 142: Orientation Systems in Open Buildings (2005)
- DIN 18065:2011-06: Stairs in Buildings – Terminology, Measuring Rules, Main Dimensions
- VDI 6008 Sheet 1:2012-12: Barrier-free Buildings for Living – Requirements and Fundamentals
- VDI 6008 Blatt 2:2012-12: Barrier-free Buildings for Living – Aspects of Sanitary Installation
- VDI 6008 Blatt 3:2014-01: Barrier-free Buildings for Living – Aspects of Electrical Installation and Building Automation
- VDI 6000 Blatt 2:2007-11: Provision and Installation of Sanitary Facilities - Workplaces and work stations
- VDI 6000 Blatt 3:2011-06: Provision and Installation of Sanitary Facilities – Public Buildings and Areas
- VDI 6000 Blatt 6:2006-11: Provision and Installation of Sanitary Facilities – Kindergarten, Day-Care Centres, Schools

## Technical construction regulations

Technical construction regulations are the technical rules imposed by publication by the highest building control authority of the *Land* in question and are thus applicable. Deviations from these technical construction regulations are permissible if a different solution fulfils the general requirements of the *Land* regulation to the same extent.

→ The developer and the architect are particularly responsible for compliance with technical construction regulations; involvement of the building control authority is not envisaged.

“Only those technical rules are adopted that are vital for fulfilling the principal requirements of the building regulations. Building control authorities are free, however, to resort to other generally accepted good engineering practice that has not been adopted in their decisions to specify abstract legal concepts.”

DIN 18040-1 was not introduced in its entirety into the list of model technical construction regulations. When imposing their regulations, many *Länder* followed the example of restricted applicability, though with deviations in individual regulations. However, DIN 18040-1 has not yet been made applicable in all the *Länder* (as of February 2014).

### Special construction guidelines/model guidelines

[www.bauministerkonferenz.de](http://www.bauministerkonferenz.de)  
for information in German, follow this  
path: Startseite → Öffentlicher Bereich  
→ Mustervorschriften → Mustererlasse  
Bauaufsicht / Bautechnik

are published by the Standing Conference of the Federal State Ministers and Senators responsible for Urban Development, Building and Housing (*Konferenz der für Städtebau, Bau- und Wohnungswesen zuständigen Minister und Senatoren der Länder, ARGEBAU*).

The following guidelines are of significance, for example, for accessibility:

- Model Ordinance on Places of Assembly (*Muster-Versammlungsstättenverordnung, MVStättV*), June 2005 version, last amended in February 2010; here, for example, the provisions on space for wheelchair users are relevant
- Model Guidelines for High-Rise Buildings (*Muster-Hochhaus-Richtlinie, MHHR*), April 2008 version, containing provisions for rescuing people with disabilities
- Model Ordinance on Garages (*Muster-Garagenverordnung, M-GarVO*) Ordinance on the construction and operation of garages and parking spaces of May 1993, last amended by decisions of 30 May 2008, containing provisions on parking space dimensions for people with disabilities.

### Integration agreement according to § 83 SGB IX

→ Employers together with the body representing employees with severe disabilities are in particular responsible for compliance with the requirements of the integration agreement, which may concern all areas of a building. They will take decisions on the extent of accessible design and on exemptions.

People with disabilities are especially dependent on solidarity and support from others and their understanding. The integration of people with disabilities into the labour market and vocational training is a precondition for equal participation in life as defined in Article 3 paragraph 3 sentence 2 of the German Basic Law. The public sector needs to act as a role model in complying with legal obligations to promote and secure equality in participation, especially in the field of work.

According to Social Code, Book IX (*Sozialgesetzbuch IX, SGB IX*), private and public sector employers with an average of at least 20 employees need to employ people with severe disabilities for a

minimum of 5% of these jobs. The targeted employment quota is higher for federal institutions and authorities. Each employer concludes a binding integration agreement with the respective body representing employees with severe disabilities and other pertinent representatives in cooperation with the employer's commissioner in accordance with § 83 SGB IX:

**“The agreement contains regulations related to integrating people with severe disabilities, especially with regard to human resource management, work station design, the working environment, work organisation, working hours, and regulations about the implementation of the above in the private and the public sector.”**

Ensuring appropriate barrier-free workplaces and apprenticeships is an important element of such an agreement, as is the necessity to have pertinent organisational units in place. The integration agreements define how representatives of people with severe disabilities, staff councils, or other representatives appointed by the employer need to be involved early on in planning new construction or modification measures. The agreements may contain very specific requirements for accessibility design in buildings.

The need for accessible workplaces is identified by the user of the building/employer in accordance with the applicable integration agreement as part of developing a decision-making document (*Entscheidungsunterlage*, ES-Bau) under Sample 13, RBBau Guidelines on space requirements.

## **Ordinance on Workplaces and Technical Rules for Workplaces**

Regulations for workplaces are defined in the Ordinance on Workplaces (*Arbeitsstättenverordnung*) of 2004:

**§ 3a (2) “Should the employer have people with disabilities in his staff, he is to set up and operate the workplace in such a way as to take into consideration the special needs of these employees in terms of occupational health and safety. This applies in particular to an accessible design of the workplace including doors, traffic routes, escape routes, emergency exits, stairs, orientation systems, wash-rooms and toilets.”**

→ The employer in coordination with the supervising authority for health and safety at the workplace is responsible for implementing and establishing the necessary measures.

The Technical Rules for Workplaces (*Technische Regeln für Arbeitsstätten*, ASR), in contrast, describe state-of-the-art technology, occupational health and safety and industrial hygiene standards, as well as other sound findings of ergonomic analysis on setting up

and operating workplaces. The requirements contained in them can be fulfilled in different ways from the ones presented here so long as occupational health and safety are ensured to the same extent. The individual needs of the employees with disabilities are the decisive factor. Compensatory measures need to be offered to counter-balance sensory or motor impairments. Accessible design of workplaces is defined in ASR V3a.2 of August 2012 as follows:

**“When it comes to occupational health and safety, accessibility design becomes necessary where people with disabilities are employed. When assessing the potential risks for the accessible design of the workplace, the impacts of the disability and resulting individual needs must be taken into consideration. The areas of the workplace to which employees with disabilities need to have access must be designed without barriers.”**

Upon involving a medical report or opinion, an accessible design is not necessary if:

**“[...] employees with a disability are not capable of executing the required functions and cannot acquire any such skills either.”**

Complementary requirements in ASR A1.3 on safety and health labeling and ASR A2.3 on escape routes and emergency exits, evacuation and rescue plans constitute part of this technical rule.



## Summary of legal basis

The legal framework depends on the individual building project, which then determine the competences and responsibilities. The following graphs illustrate four different measures with their respective legal foundations and responsibilities. They are intended to explain how the above can change depending on the building project, yet sometimes overlap.

Publicly accessible areas in:

- buildings offering cultural and educational services
- sports and leisure facilities
- health service facilities
- office, administrative and court buildings
- sales facilities, catering and hotel facilities
- parking lots, garages and public toilets

are defined in § 50 MBO as general areas used for visitor and user traffic such as:

- entrance areas and lobbies
- cloak-rooms
- sales rooms
- public toilets
- offices open to the public
- counters and waiting rooms
- press and reception areas
- rooms for accommodation and catering
- exhibition and conference halls
- reading rooms, library spaces
- class rooms and conference rooms
- sports rooms
- and their access routes.

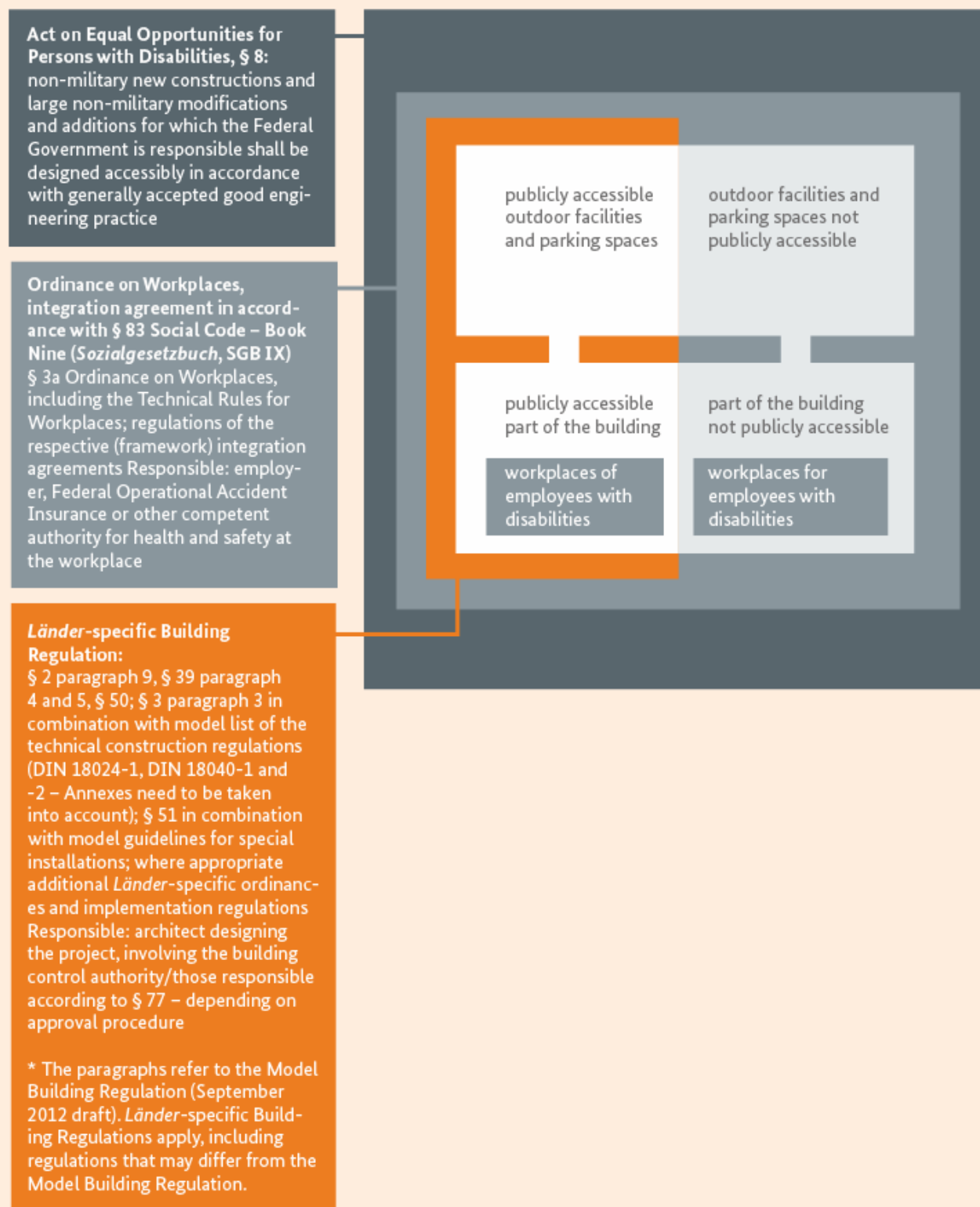
Areas that are not publicly accessible are mainly used as workplaces. Workplaces are defined as places the employees need for executing their jobs, such as:

- working rooms (such as offices and laboratories)
- meeting and conference rooms
- warehouses, machine and side rooms
- break rooms and staff rooms
- pantries and cafeterias
- sanitary and first-aid rooms
- internal access routes (traffic routes, ramps, stairs, doors, escape routes, emergency exits).

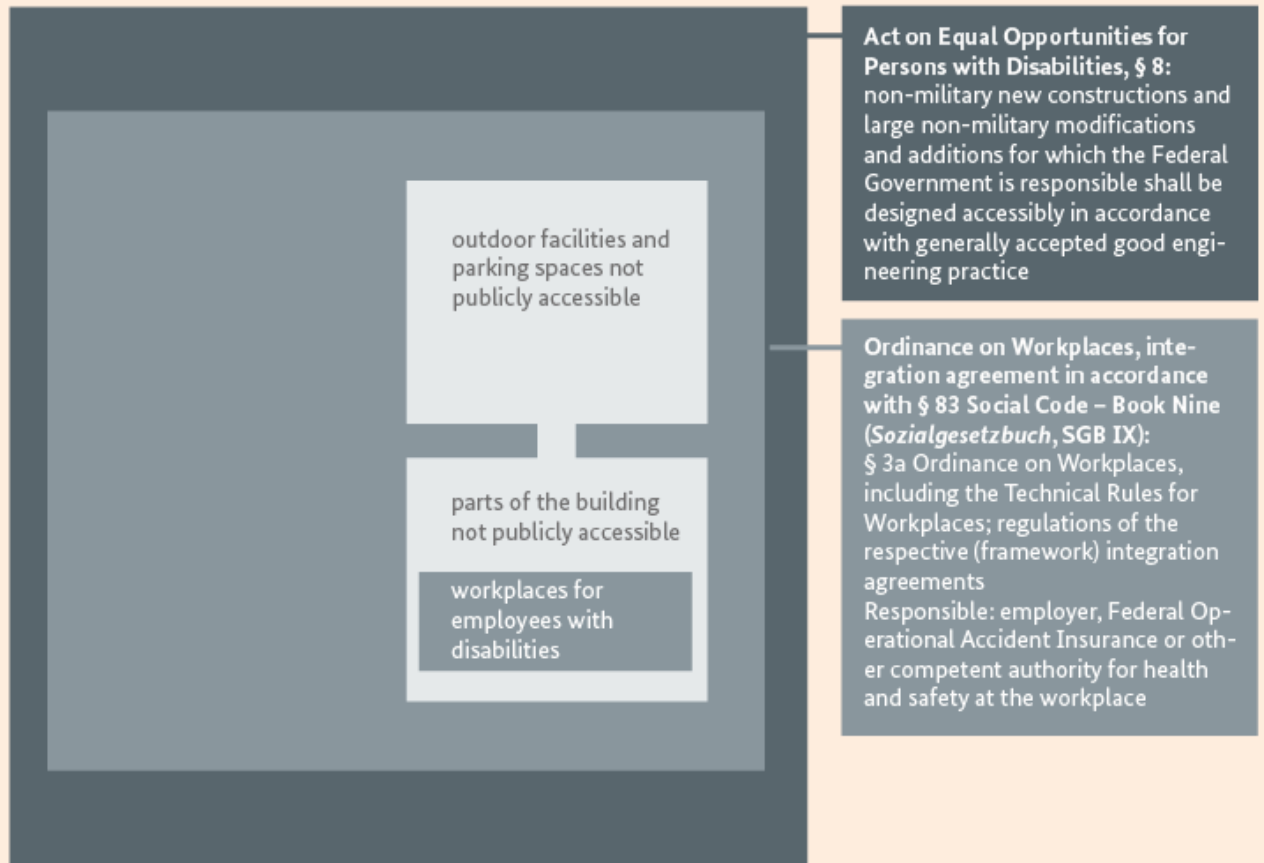
It is important that those involved and responsible for a project have an understanding of the legal basis and responsibilities right from the beginning of a building project. Clear responsibilities are especially important when it comes to decisions on deviations from accessibility requirements.

In a publicly accessible part of a building which also serves as a workplace, for example, a deviation needs to be assessed and decided by those responsible for the construction in accordance with the building code as well as by those responsible for health and safety at the workplace and for § 83 SGB IX. This case would also constitute a deviation from § 8 BGG.

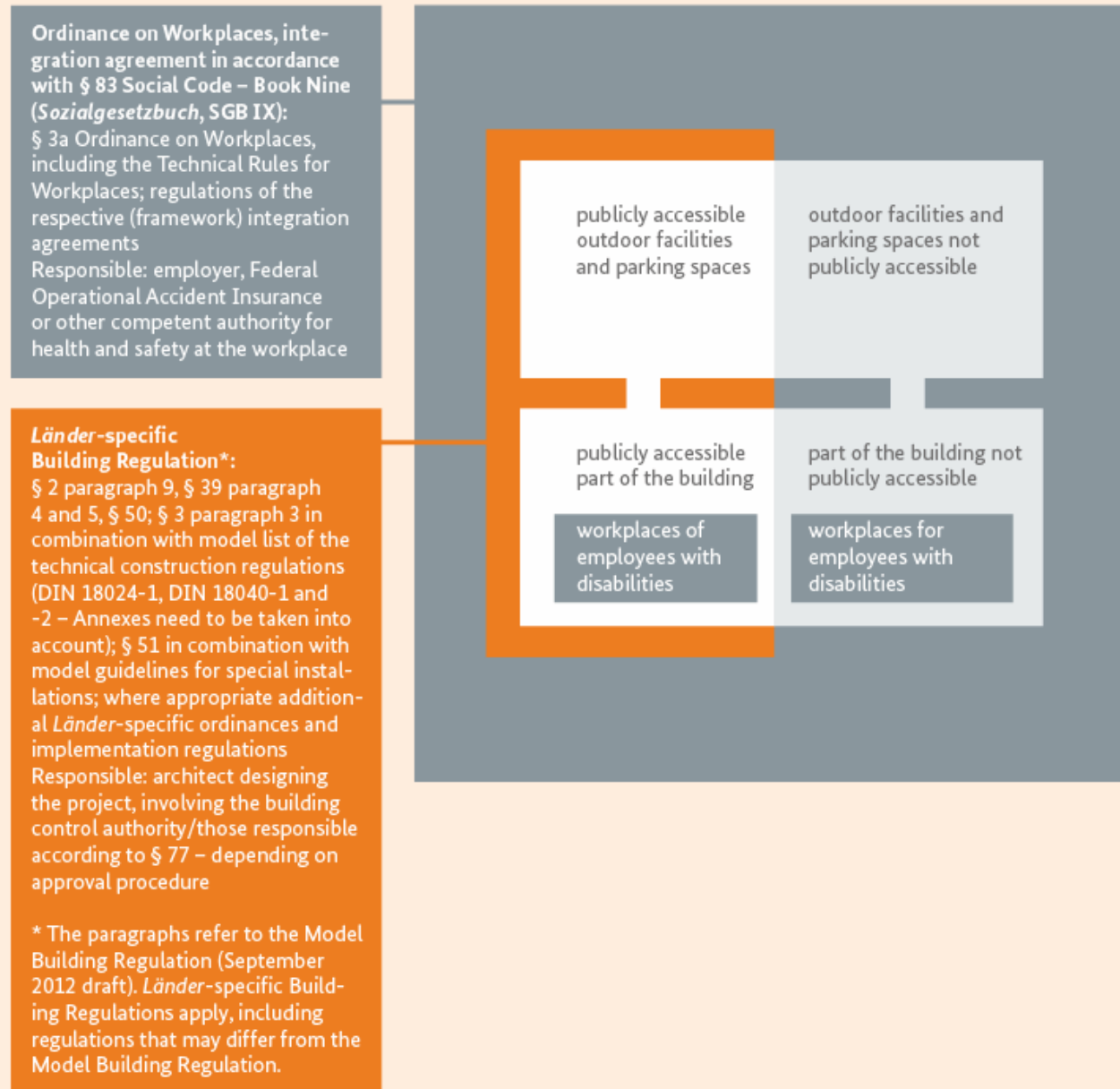
## Non-military small new constructions (Section D RBBau Guidelines) and non-military large new constructions, modifications, and additions (Section E RBBau Guidelines) with publicly accessible parts



## Non-military small new constructions (Section D RBBau Guidelines) and non-military large new constructions, modifications, and additions (Section E RBBau Guidelines) without publicly accessible parts

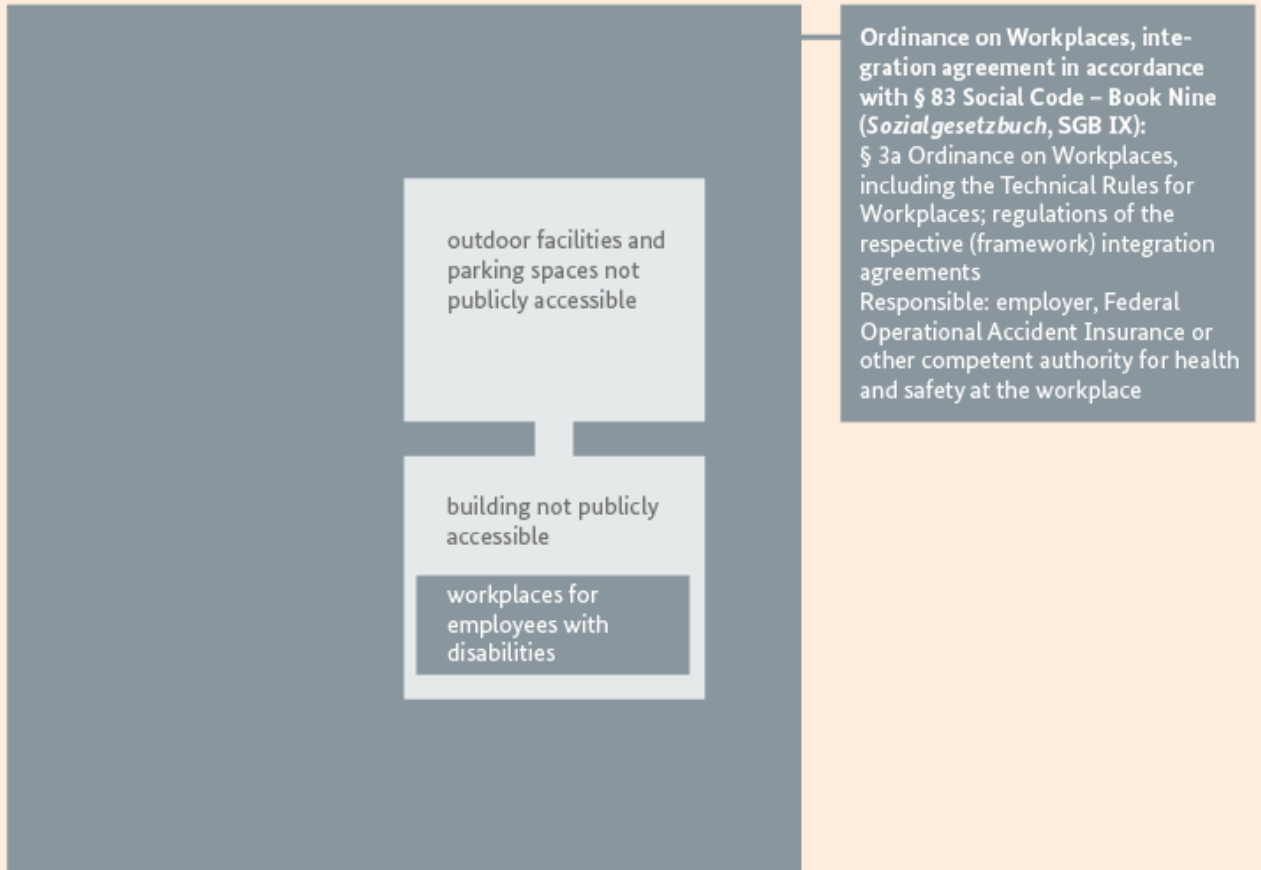


## Non-military small modifications and additions (Section D RBBau Guidelines) with publicly accessible parts





## Non-military small modifications and additions (Section D RBBau Guidelines) w i t h o u t publicly accessible parts



## *Baukultur* and historic monuments

[www.bundesstiftung-baukultur.de](http://www.bundesstiftung-baukultur.de)

The term *Baukultur* describes a responsible way of introducing man-made changes to the natural or built environment. The Federal Government aims to promote and improve the quality of the built environment, in particular with regard to including accessibility in a cost-efficient way in architectural concepts and open space planning. To design plans that enable participation as a fundamental right is a creative challenge for planners.

Accessibility in a historical context requires looking for creative and tailor-made solutions that do not necessarily oppose the interests of protecting heritage sites. A modern use of a historic building developed in accordance with heritage protection rules constitutes an indisputable quality in the light of demographic developments.

By creatively combining the requirements of accessibility planning and barrier-free building with heritage protection regulations, the aim is to achieve a barrier-free and integrated basic concept for a building project without major changes to the fabric of a building. A system of communication among every one involved in the procedure is a precondition to finding good solutions.

## Sustainable building

Accessibility is one element of sustainable building. As such it is a self-evident feature of a viable built environment.

[www.nachhaltigesbauen.de](http://www.nachhaltigesbauen.de)

According to the Guideline for Sustainable Building for Federal Buildings, sustainable building aims to construct and operate buildings in such a way that they are viable economically and ecologically, and in terms of urban and social developments. The Guideline for Sustainable Building generally describes, defines, and explains the objectives.

The criteria of the assessment system for sustainable building for federal buildings (*Nachhaltiges Bauen für Bundesgebäude*, BNB) reflect the complexity of the planning processes. The assessment system describes the individual assessment criteria in detail. As a case in point the evaluation system for newly to-be-built office and administrative buildings (Federal Ministry of Transport, Building and Urban Development 2011) considers non-compliance with DIN 18040-1 on publicly accessible areas a criterion for exclusion of a proposal. However, the person carrying out the assessment is free to take into account solutions enabling barrier-free use in other ways.

The assessment system for sustainable building covers the quality of publicly accessible areas and workplaces. Above-average accessibility will be recognised. The possibilities provided by the project to make an office building usable and accessible to every person are definitive.

Assessment systems are currently being tested or developed for additional types of buildings and will be updated and published on a regular basis (as of February 2014).

## Cost efficiency

Research project of the ETH Zurich,  
Chair for Architecture and Construction  
Management on disability adapted  
building – implementation problems in  
the planning process, 2004.

The cost intensity of barrier-free building is often over-estimated. Accessibility in built environments provides an added value for everyone and enhances user convenience.

Studies carried out in Switzerland have proved that the costs for accessibility in new building projects (public buildings, workplaces) above a total construction cost of three million euros amount to a maximum of 0.5% of that sum. Two thirds of these costs are incurred by measures that constitute an added value for everyone. Only one third is used for specific measures for people with special needs. For smaller new constructions, the study found that accessibility costs constitute 1.5 to 4% of the total costs. Higher extra costs of up to 15% of the building sum have been identified for smaller-scale modifications. However, the extra costs for structural measures as compensation for sensory disabilities amounted to only about 3% of the total cost of the building project.

Generally speaking, smart, integrated planning can help reduce the costs considerably. When planned right from the start and implemented, conclusive concepts that are retrofittable reduce increased costs or cost-intensive modifications in the future.





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## Introduction to Part B

The Guidelines for Federal Construction Measures (RBBau Guidelines) apply to measures for which the Federal Government is responsible. As stipulated by RBBau Guidelines, each procedure is broken down into individual steps: requirements planning, analysis of alternatives to fulfil requirements, qualification for construction-related decision-making document (*Entscheidungsunterlage-Bau*, ES-Bau), construction-related draft document (*Entwurfsunterlage-Bau*, EW-Bau), detailed design phase, construction and handing over of completed project or documentation. Each of the individual steps are concluded with a documented or approved status report.

On the basis of RBBau Guidelines, the Guideline Accessibility in Building Design provides a structure for the accessibility procedure ranging from requirements planning to implementation, and it allocates responsibilities.

It defines minimum accessibility in terms of implementation and equipment for federal buildings that are publicly accessible and accommodate workplaces, and the associated outdoor facilities. This minimum accessibility content needs to be provided for each and every step in the planning procedure. Part C of the Guideline provides a structural outline and is intended to serve as a checklist.

In essence, the Guideline aims to embed accessibility requirements into the procedure throughout and to offer stakeholders help in implementing them. The obligation to set up ACCESSIBILITY CONCEPTS/PROOFS at the same time as each procedural step in accordance with the requirements defined below is an essential component. Such an approach is also useful for transparently depicting decisions on accessibility measures. The protection targets as defined by DIN 18040-1 can be used as a basis for developing solutions that are neither explicitly described in the DIN standard, nor are shown in images or texts in the present Guideline.

The structure suggested by the Guideline with respect to developing ACCESSIBILITY CONCEPTS/PROOFS follows the areas of action laid out in Part C. This approach enables a simple and systematic review as well as a description of how accessibility requirements have been taken into consideration. Since the planning and construction requirements for each area of action correlate to the individual steps of the procedure, their significance for each step can be identified easily; only specific paragraphs must be consulted, depending on the procedural phase. The obligation to provide CONCEPTS and PROOFS confirming ACCESSIBILITY on the basis of approved requirements planning in accordance with Clause 2.2.1.3 Section E RBBau Guidelines needs to be included in contracts with freelancers. These services usually do not qualify as Additional Services according to the Official Scale of Fees for Services by Architects and Engineers (*Honorarordnung für Architekten und Ingenieure*, HOAI) so long as they are required in the course of fulfilling public regulations and legal standards or generally accepted good engineering practice. The question whether the preparation of texts and/or plans proving that accessibility requirements have been adhered to constitutes a service exceeding the basic services covered by HOAI needs to be reviewed in individual cases.

The opening clause of the protection targets assumes that planners and those involved in the construction phase have extensive background knowledge in accessibility planning and barrier-free building. The Guideline cannot cover every aspect of the complex issue in all its details. If clarification is needed, or if the building project is complex, additional assistance centres may be consulted, such as the coordination centres of municipal authorities, the information centres of the Chambers of Architects in the different *Länder*, or competence centres. Representative bodies of people with disabilities and their associations should also be included in the coordination processes on a consultative basis.



## RBBau Guidelines and accessibility requirements

procedural steps pursuant to RBBau Guidelines	including accessibility	who is responsible
<b>ES</b> <b>ES-Bau (decision-making document)</b> → cf. HOAI: LP 1 and for some parts LP 2		
<b>requirements planning</b> pursuant to Clause 2.2.1 Section E RBBau Guidelines	<b>reviewing accessibility requirements in requirements planning</b>	<b>user</b> (involving owner, building authority)
<b>analysing alternatives to fulfil requirements</b> pursuant to Clause 2.2.2 Section E RBBau Guidelines	<b>reviewing accessibility requirements in analysis of alternatives</b>	<b>owner</b> (involving building authority)
<b>qualifying for ES-Bau</b> pursuant to Clause 2.2.3 Section E RBBau Guidelines	<b>developing:</b> ACCESSIBILITY CONCEPT	<b>building authority</b>
<b>EW</b> <b>EW-Bau (construction-related draft document)</b> → cf. HOAI: LP 2, 3, and 4; for some parts LP 5		
pursuant to Clause 3 Section E RBBau Guidelines planning pre-draft, draft, application documents	<b>compiling:</b> ACCESSIBILITY PROOF	<b>building authority</b>
<b>A</b> <b>detailed design phase</b> → cf. HOAI: LP 5 and 6		
pursuant to Clause 4 Section E RBBau Guidelines detailed design work, specification lists	<b>updating:</b> ACCESSIBILITY PROOF	<b>building authority</b>
<b>construction</b> → cf. HOAI: LP 7 and 8		
pursuant to Section G RBBau Guidelines construction supervision	<b>controlling compliance with:</b> ACCESSIBILITY PROOF documentation of necessary deviations during construction	<b>building authority</b>
<b>hand-over and documentation</b> → cf. HOAI: LP 9		
pursuant to Section H RBBau Guidelines documentation	<b>preparing:</b> hand-over and documentation	<b>building authority</b>

## Requirements planning

A review of all the requirements marked **ES** in Part C of the Guideline Accessibility in Building Design is recommended for taking accessibility adequately into consideration in accordance with Clause 2.2.1 Section E RBBau Guidelines on large-scale new constructions, modifications, and additions. Furthermore, the following aspects need to be covered:

- identifying the necessity for publicly accessible areas and workplaces
- establishing special requirements on accessibility design with regard to workplaces in coordination with the representative bodies of people with severe disabilities
- illustrating accessibility requirements in the space requirement plan (cf. Sample 13 RBBau Guidelines) on workplaces and publicly accessible areas; the needed increase of 10 to 12% space for the areas in question needs to be reviewed
- requirements on the building plot, such as location of accesses, topography
- requirements on external access, such as barrier-free connection to public and private transport, number of barrier-free parking spaces needed for publicly accessible areas and workplaces
- requirements on the quality of internal access, vertical and horizontal access (publicly accessible areas, workplaces)
- required number of accessible sanitary rooms in publicly accessible areas and workplaces
- quality of the space required – establishing which rooms require special accessible design
- establishing requirements on the accessibility of outdoor spaces other than those used for access or waiting

### Small new constructions, modifications, and additions

As new constructions, modifications, and additions of a small scale may also bring about significant structural changes, an assessment is recommended as to whether the planned building task affects any accessibility requirement laid out in this Guideline. The assessment should be carried out when identifying the need for a new construction, modification, or addition in accordance with Sec-



→ The user is responsible for requirements planning.

In the context of requirements planning, the user is to turn to the building authority, involving the commissioning agency responsible for the project, if specialist advice or support is needed with regard to structural accessibility issues.

As outlined in the integration agreements, the representative bodies for people with severe disabilities, staff councils, or other employer representatives need to be included early on.

tion D RBBau Guidelines. If this proves to be the case, a procedure analogous to large new constructions, modifications, and additions should be pursued.

If necessary, the requirements marked **ES** in Part C of the Guideline Accessibility in Building Design should be examined. The aspects described above need to be adapted to the building task in question and reviewed accordingly.

## Analysis of alternatives to fulfil requirements

In the context of analysing alternatives to fulfil the requirements in accordance with Clause 2.2.2 Section E RBBau Guidelines, all the requirements marked ES in Part C of the Guideline Accessibility in Building Design need to be juxtaposed understandably with the requirements planned for the specific user at a comparable level of detail.

Alternatives to be analysed can be the following:

- new construction to be commissioned by the agency owning the property
- modifications and additions to be commissioned by the agency owning the property (including potential modifications that may be needed to ensure accessibility)
- purchasing existing built structures
- new construction, modifications, or additions as public private partnerships
- renting, leasing, or renting to buy buildings

### Construction in existing buildings – Modifications

In the case of existing buildings, existing deviations from the protection targets of the Guideline Accessibility in Building Design need to be described and the need for the modifications identified.

When existing buildings are purchased, rented, rented to buy, or leased, it is particularly important to review not only the requirements marked **ES** in the Guideline Accessibility in Building Design, but also those marked **EW**. Only in this way is it possible to assess early on whether the protection targets can be met.

An analysis of alternatives may require feasibility studies or planning services. They can clarify whether the property enables an accessible use as defined in the requirements planning, and whether accessibility measures would be in line with heritage conservation requirements.

### Deviations from accessibility requirements

The permissibility of deviations needs to be coordinated with those responsible (e.g. employer or competent authority) and needs to be documented.

→ The agency commissioning the building project is responsible for the analysis of alternatives. This agency needs to turn to the building authority for specialist advice and support in the analysis of alternatives to fulfil accessibility requirements in accordance with the established requirements planning. The representative body for people with disabilities of the building's user needs to be involved.

## ES-Bau ACCESSIBILITY CONCEPT



→ The building authority is responsible for completing documentation.

For the variants of renting, renting to buy, leasing, and public private partnerships and in the case of construction projects eligible for grants, it is also recommended to develop an ACCESSIBILITY CONCEPT in accordance with the Guideline Accessibility in Building Design.

The ACCESSIBILITY CONCEPT is developed on the basis of the planning status established for the individual planning task. The textual explanation and the level of planning detail are to be adapted to the dimension of the specific decision-making document ES-Bau.

Once the decision is taken to commission a project, the ACCESSIBILITY CONCEPT needs to be developed as follows when qualifying for ES-Bau (construction-related decision-making document) according to Clause 2.2.3 Section E RBBau Guidelines:

### Large new constructions, modifications, and additions

The ACCESSIBILITY CONCEPT calls for verified compliance with all the requirements marked **ES** in the Guideline Accessibility in Building Design for both new constructions and existing buildings.

### Small new constructions, modifications, and additions

An ACCESSIBILITY CONCEPT is recommended as even small new constructions, modifications, and additions may bring about significant structural changes. If a review in accordance with Section D RBBau Guidelines in the context of identifying the need for a new construction, modifications, and additions finds that the accessibility requirements described in the Guideline will not be affected, no ACCESSIBILITY CONCEPT is required.

Where warranted, the ACCESSIBILITY CONCEPT calls for verified compliance with all the requirements marked **ES** in the Guideline Accessibility in Building Design. The level of detail to which compliance needs to be demonstrated is to be adapted to the respective building task.

### Deviations from accessibility requirements

The permissibility of deviations needs to be coordinated with those responsible (e.g. employer or competent authority) and needs to be documented.

### ACCESSIBILITY CONCEPT

The ACCESSIBILITY CONCEPT must be described in text and graphically illustrated. Following the Guideline's areas of action, it needs to prove that the requirements of the Guideline Accessibility in Building Design have been respected.

### Exemplary structure of textual explanation

The structure of the textual explanation needs to fit the dimension and the respective requirements of a specific building task. The textual part is to be prepared according to the following structure or the structure of Part C of the Guideline (where applicable, with a distinction between publicly accessible areas and workplaces):

**Overall concept**

- integration into the urban environment
- orientation and guidance systems

**Access**

- overall concept of vertical and horizontal access to publicly accessible areas and workplaces
- transition between exterior/interior

**Furnishings and fittings**

- overall concept of the furnishings and fittings in publicly accessible areas, workplaces, and the exterior space (where applicable, with a distinction between publicly accessible and not publicly accessible areas)

**Rooms**

- publicly accessible areas
- workplaces
- sanitary rooms
- rooms requiring special accessible design

**Graphical illustration**

The graphic illustration is based on the core drawings and graphs required for this procedural phase in accordance with Clause 1.4 Section F RBBau Guidelines or Service Phase 2 (*Leistungsphase 2*, LP 2) according to the HOAI scale. The level of detail is to be adapted to the specific building task.

The ACCESSIBILITY CONCEPT legend needs to be taken into account. It needs to be adapted to what is required for the specific building task in question.



	publicly accessible areas		accessible information counter
	workplaces		communication aid
	shared routing visitors		accessible toilets
	separate routing visitors with impairments		accessible bathrooms
	separate routing visitors without impairments		special requirements TBS (technical building services)
	shared routing staff		accessible workplace (A for <i>Arbeitsstätte</i> )
	separate routing staff with impairments		
	separate routing staff without impairments		
	accessible public transport stop or station		
	accessible parking space		
	accessible ramp		
	accessible staircase		
	accessible lift		
	threshold-free transition exterior/interior		
	special requirements for fire prevention		

#### Example of legend ACCESSIBILITY CONCEPT

The sample legend provides orientation when developing a graphical ACCESSIBILITY CONCEPT and can be adapted to the project in question. Not all the symbols need to be used so long as the plan's readability is ensured in other ways.

The following components usually need to be taken into consideration for a graphical illustration of the concept:

- illustrating the property's connections to public transport (documenting accessibility and where applicable, clarification whether modification measures can be implemented) on a copy from the cadastral register including neighbouring buildings at a 1:1,000/1:5,000 scale (cf. Clause 1.4.6 Section F RBBau Guidelines).
- graphical illustrations of the planning concept (cf. Clause 1.4.7 Section F RBBau Guidelines) including a diagrammatic layout of the entry level and the outdoor facilities using colour to highlight how visitors and staff with and without impairments are guided from the public transport stop or station and/or the parking spaces to the barrier-free, vertical access area or stair access.
- illustrating how accessible parking spaces are allocated to the entrances.
- illustrating the grade elevation needed for understanding and proving accessibility.
- illustrating the areas defined as publicly accessible areas and as accessible workplaces in requirements planning.
- illustrating barrier-free access to all floors that have publicly accessible areas and accessible workplaces.
- marking the areas with special requirements for accessibility design.
- marking barrier-free sanitary rooms in publicly accessible areas and in areas designated for accessible workplaces.
- illustrating exterior spaces intended for accessible use according to requirements planning.

## EW-Bau ACCESSIBILITY PROOF



The building authority is responsible for drafting EW-Bau.

Contracted freelancers are responsible for developing an approvable planning scheme.

For the variants of renting, renting to buy, leasing, and public private partnerships and in the case of construction projects eligible for grants, it is also recommended to develop an ACCESSIBILITY PROOF in accordance with the Guideline Accessibility in Building Design.

When preparing the construction-related document (*Entwurfsunterlage-Bau*, EW-Bau) in accordance with Clause 3 Section E RBBau Guidelines, the ACCESSIBILITY PROOF needs to be compiled as follows:

### Large new constructions, modifications, and additions

The ACCESSIBILITY PROOF requires verified compliance with all the requirements marked **EW** in the Guideline Accessibility in Building Design for both, new constructions and existing buildings.

### Small new constructions, modifications, and additions

An ACCESSIBILITY PROOF is recommended as even small new constructions, modifications, and additions may bring about significant structural changes. If, when determining the need for a new construction, modifications, and additions in accordance with Section D RBBau Guidelines, a review finds that the accessibility requirements described in the Guideline will not be affected, no ACCESSIBILITY PROOF is required. The PROOF's level of detail is to be adapted to the respective building task.

### Deviations from accessibility requirements

The permissibility of deviations needs to be coordinated with those responsible (e.g. employer or competent authority) and needs to be documented.

### Awarding freelance contracts

Planning services for large new constructions, modifications, and additions are usually subcontracted to freelancers. The result of accessibility-related requirements planning and, if available, the ACCESSIBILITY CONCEPT of ES-Bau needs to be handed over and explained to the freelancers.

The Guideline Accessibility in Building Design stipulates the ACCESSIBILITY PROOF to be compiled by freelancers.

### Competitions

According to Clause 3.4 Section E RBBau Guidelines, design competitions are held for significant construction measures in order to promote *Baukultur*. Depending on the detail of the competition, the accessibility-related requirements planning and, if available, the ACCESSIBILITY CONCEPT should be part of the tender either in their entirety or in excerpts, to the extent they are relevant for the services that are the subject of the competition. Services to help develop the ACCESSIBILITY CONCEPT could also be required in the tendering process, depending on its scope. The PROOF needs to be provided in the course of drafting EW-Bau.

## **ACCESSIBILITY PROOF**

The ACCESSIBILITY PROOF must be provided in text and graphically illustrated. Following the Guideline's areas of action, it needs to prove that the requirements of the Guideline Accessibility in Building Design have been respected. The textual part is to be adapted to the following structure, which in turn corresponds to the areas of action in Part C.

### **Exemplary structure of textual explanation**

(where appropriate, with a distinction between publicly accessible areas and workplaces)

#### **Overall concept**

1. Integration into the urban environment
2. Orientation and guidance systems

#### **Access**



























3. Walkways and circulation areas
4. Corridors and horizontal access areas
5. Interior and exterior ramps
6. Interior and exterior stairs and steps
7. Lifts
8. Interior and exterior doors
9. Emergency alarm and evacuation

#### **Furnishings and fittings**

10. Service counters, cash registers, controls, assistance centres, waiting halls
11. Interior and exterior furniture and fixtures
12. Operational elements and communications systems
13. Windows and glass surfaces

#### **Rooms**

14. Exterior spaces
15. Lobby/entrance
16. Storage space for wheelchairs, cloak-rooms
17. Event halls
18. Museums and exhibitions
19. Rooms for catering and kitchenettes
20. Sanitary installations
21. Office workplaces, laboratories
22. Accommodation

	space requirement 150 × 150 cm and space requirement 130 × 90 cm (plotted to scale)		ground materials, exterior, contrasts, tactile and visual
	passage width 90 cm (plotted to scale)		stair marking
	accessible lift Type 2 110 × 140 cm (plotted to scale)		guidance strip
	special requirements for fire prevention		hazard warning surfaces
	threshold-free transition exterior/interior		accessible drains/drainage
	special requirements TBS (technical building services)		other guidance elements
	accessible information counter		visual guidance system, floor
	audio induction loops, radio and infrared systems		visual guidance system, wall or handrails
	automatic sliding door or revolving door (plotted to scale)		tactile guidance system, floor
	revolving door with push-button system (plotted to scale)		tactile guidance system, wall or handrails
	door with hold-open device (plotted to scale)		guidance system, acoustic
	accessible seat (plotted to scale)		guidance system, lighting
	flooring materials, interior, surface contrasts, interior, tactile and visual		
	surface contrasts, exterior: tactile		
	ground materials, exterior: accessible		

#### Example of a legend ACCESSIBILITY PROOF

The sample legend provides orientation when developing a graphical ACCESSIBILITY PROOF and can be adapted to the project in question.

Not all the symbols need to be used so long as the plan's readability is ensured in other ways.

### Graphical illustration

The graphical illustration is based on the core drawings and graphs required for this procedural phase in accordance with Clause 2.4 Section F RBBau Guidelines (corresponding to LP 2, 3, 4, and where applicable, LP 5 of the HOAI scale depending on the level of detail of the explanation agreed in the contract). The level of detail corresponds to the planning phase and, if necessary, is to be adapted to the specific building task.

The ACCESSIBILITY PROOF legend needs to be taken into account. It needs to be adapted to what is required for the specific building task in question.

To show proof for individual details of solutions, it suffices to refer to the drawings required for this procedural phase, provided that they unequivocally demonstrate that accessibility requirements have been fulfilled. The following components usually need to be taken into consideration for a graphical illustration of the concept:

- illustrating the property's connections to public transport (documenting accessibility and where applicable, clarification whether modification measures can be implemented) on a copy from the cadastral register including neighbouring buildings at a 1:1,000/1:5,000 scale (cf. Clause 1.4.6 Section F RBBau Guidelines).
- graphical illustration of the planning concept as a location map at an appropriate scale, including the floor plan of the entry level and the outdoor facilities, using colour to highlight how visitors and staff with and without impairments are guided from the public transport stop or station and/or the parking spaces to the barrier-free vertical access areas or stair access.
- illustrating the areas defined as publicly accessible areas and as accessible workplaces in requirements planning.
- illustrating barrier-free access to all floors that have publicly accessible areas and accessible workplaces.
- illustrating how accessible parking spaces are allocated to the entrances and proving that the required number of parking spaces has been provided.
- proving compliance with the requirements on accessible topography and technically needed drainage by stating the heights or contour lines and gradient changes.



- illustrating orientation and guidance systems, where necessary, at an appropriate scale and in their guidance details
- illustrating the rooms with special requirements for accessibility design and pertinent measures to be taken (where appropriate, integrating the illustration of technical building services).
- illustrating barrier-free sanitary rooms in publicly accessible areas and in the areas designated for accessible workplaces.
- illustrating the measures envisaged for exterior spaces intended for accessible use according to requirements planning.
- material specification where they are relevant for understanding the accessibility design, explained in text for interior and exterior spaces and, where appropriate, complemented with photographic representations.

## Detailed design phase

### Large new constructions, modifications, and additions

Accessibility-related detailed design work in accordance with Clause 4 Section E RBBau Guidelines becomes necessary when, for instance, customised solutions are developed for listed buildings, or when adaptations arise due to further development during the detailed design phase or due to changes vis-à-vis EW-Bau.

Accessibility is demonstrated by updating and expanding the ACCESSIBILITY PROOF when drafting EW-Bau, in texts and plans, at the scales required for the detailed design phase in accordance with Clause 3 Section F RBBau Guidelines. To show proof of individual details of solutions, it suffices to refer to the drawings required for this procedural phase (in accordance with Clause 3 Section F RBBau Guidelines and LP 5, HOAI), provided that they unequivocally illustrate that accessibility requirements have been fulfilled.

### Small new constructions, modifications, and additions

When planning small new constructions in accordance with Clause 3 Section D RBBau Guidelines, the procedure applies mutatis mutandis. The same is true for modifications and additions if an ACCESSIBILITY PROOF has been compiled.

### Deviations from accessibility requirements

The permissibility of deviations needs to be coordinated with those responsible (e.g. employer or competent authority) and needs to be documented. In the case of publicly accessible buildings, a supplement to the regulatory construction permit may become necessary.

Samples of customised material or design solutions should be produced prior to or at the latest upon awarding the contract. The customised solution will be implemented only after the sample has been approved.



→ The building authority and the architect designing the project are responsible.

## Construction phase

→ The building authority and the architect designing the project are responsible.

During construction, compliance with the requirements of the ACCESSIBILITY PROOF is monitored in the context of construction supervision. Any changes or adaptations that may be necessary need to be documented.

### **Deviations from accessibility requirements**

The permissibility of deviations needs to be coordinated with those responsible (e.g. employer or competent authority) and needs to be documented.

In the case of publicly accessible buildings, a supplement to the regulatory construction permit may become necessary.

## Hand-over of completed project and documentation

When parts of the project or the entire project are handed over in accordance with Clause 1.3 Section H RBBau Guidelines, compliance with the requirements from the ACCESSIBILITY PROOF needs to be taken into account and documented as part of a joint written record. The representative body for people with disabilities of the building's future users needs to be involved.

→ The building authority and the architect designing the project are responsible.

The core drawings and graphs required for this procedural phase according to Clause 1.4 Section H RBBau Guidelines can be used for graphically illustrating compliance with the requirements from the ACCESSIBILITY PROOF.

The following illustrations are required, at least as a summary at the same scale as in EW-Bau, so that accessibility requirements fulfilled during construction can also be taken into account during follow-up maintenance measures. A review is necessary in order to assess whether the illustrations from the ACCESSIBILITY PROOF of EW-Bau or the detailed design phase can be updated. The ACCESSIBILITY PROOF legend needs to be taken into account. In individual cases, it can be adapted to the particular requirements of a specific building task.

- graphical illustration of the planning concept as a location map at an appropriate scale, including the floor plan of the entry level and the outdoor facilities, using colour to highlight how visitors and staff with and without impairments are guided from the public transport stop or station and/or the parking spaces to the barrier-free vertical access areas or stair access.
- illustrating the areas defined as publicly accessible areas and as accessible workplaces in requirements planning.
- illustrating barrier-free access to all floors that have publicly accessible areas and accessible workplaces.
- illustrating the installation of orientation and guidance systems where applicable.
- illustrating how accessible parking spaces are allocated to the entrances and proving that the required number of parking spaces has been provided.
- illustrating compliance with requirements on accessible topography.

- illustrating rooms in which special accessibility measures have been implemented.
- illustrating barrier-free sanitary rooms in publicly accessible areas and in the areas designated for accessible workplaces.

The textual explanation may be complemented by an update of the ACCESSIBILITY PROOF in individual cases, where appropriate. The changes, decisions, and adaptations implemented during construction are to be documented.

For workplaces, a compilation of the rules on health and safety at the workplace and on accident prevention need to be included in the dossier.







Photo by Barbara Aumüller

## Part C – Areas of action

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## Introduction to Part C

On the basis of DIN 18040-1, accessibility requirements are divided into the following areas of action: overall concept, access routes, furnishings and fittings, and rooms. The Guideline also takes into consideration and refers to pertinent aspects of generally accepted good engineering.

It thus provides an overview of the accessibility requirements current at the time it was published. When applying the Guideline, especially planners and companies carrying out contracts are not, however, released from their responsibility to consult other relevant standards.

As the areas of action can be of varying significance or no significance at all for specific building projects, the Guideline is structured by area of action and provides a fast and organised overview of the requirements to be taken into account depending on the planning or building task.

The planning and building requirements in each area of action are described in correlation to the planning procedure so that their significance for the respective planning phase is easily recognisable (» instructions for use page 55).

As outlined in the » table on page 30, the steps in a procedure according to RBBau Guidelines are based on the Official Scale of Fees for Services by Architects and Engineers (*Honorarordnung für Architekten und Ingenieure*, HOAI) *mutatis mutandis*. The table lists the individual services covered by HOAI. This makes a simple transfer possible when the Guideline is used for other public buildings, work places, and outdoor facilities for which the Federal Government is not responsible.

## The requirements and special needs of people with disabilities

“[...] takes into consideration especially the needs of persons with visual impairments, blind persons, persons with hearing impairments (deafness, late-onset deafness, hard of hearing) or with motor impairments, and persons using mobility aids and wheelchairs. Other groups, such as persons of short or tall stature, persons with cognitive impairments, older persons, children, and persons with baby carriages or luggage, will benefit from some of the requirements of this standard.”

Preface DIN 18040-1:2010-10

People have varying types of impairments, which in turn impose a wide range of requirements on their surroundings. The special needs of people with impairments were studied on the basis of **DIN 18040-1** in order to be able to define planning and building requirements. **Four groups of requirements for a built environment have been identified in this process.**

In the illustrations for individual areas of action the specific impairments are indicated by pictograms. This approach has led to a system that can be used for developing CONCEPTS and PROOFS OF ACCESSIBILITY depending on the requirements posed by the impairments in question.





### Motor impairment, poor stamina and anthropometry

This user group comprises people who:

- are permanently or temporarily restricted in their physical movement, especially in using arms, legs, and hands,
- use mobility aids or wheelchairs,
- are of short or tall stature,
- do not display standard anthropometry, such as children
- show weakness due to age,
- are carrying baby carriages or luggage.

The impairments above primarily generate the need for more space and the avoidance of thresholds. Particular importance should be attached to concepts for horizontal and vertical access. Geometric specifications such as passage width or height of operational elements need to be taken into consideration. Another area of action aims at easy-to-use devices requiring acceptable levels of physical strength and stamina.



### Visual impairment

The ability to see of visually impaired people is significantly restricted, but visual orientation and information are still possible. In contrast, blind people have no or almost no vision. They depend primarily on their tactile and auditory senses for orientation and information. If necessary, they use a cane or a guide dog.

The structural needs of these two user groups mainly concern orientation and guidance systems, and avoiding dangerous situations and obstacles. In the case of visual impairments, the use of contrasts and light is essential, while haptic, tactile, and auditory measures can be employed for blind people. The information and guidance systems need to be consistent and must not be interrupted. It is especially important to convey information on the basis of a bi-sensory principle. As outlined in » chapter 2.1 it is important to know whether visually impaired people frequent a building on a regular basis or rarely or one time only, and how familiar they may be with the building's structure, as, depending on this, the type of orientation can be provided differently.

### Cognitive impairment

This user group comprises people with mental disabilities such as learning disabilities but also older people and people suffering from dementia. This group is increasing in terms of numbers very quickly due to demographic developments. This group is characterised by impairments with regard to memory, thinking, orientation, comprehension, numeracy, learning, speech, and powers of judgment.



With age, some people show signs of a slow-down of their thinking processes, which may lead to a slow-down of their actions.

Structural areas of action mainly focus on orientation: structured access routes, clear and manageable floor plan design, easily understandable orientation systems and unambiguous allocation of functions. Any information should be conveyed in simple language.

### Auditory impairment

This user group consists of people whose hearing is significantly restricted as well as people who have lost their sense of hearing altogether. Sign language is often used as a means of communication. In Germany, sign language was officially recognised in 2002 through the Equal Opportunities for People with Disabilities Act (*Behindertengleichstellungsgesetz, BGG, §6*).



Structural interventions that compensate for these impairments focus on careful consideration of acoustics in a building, for example, reducing background noise, or using supporting technology such as audio induction loops. However, using consistent lighting is also helpful here, for example, to make sure that the sign language interpreter can be clearly seen.

Generally speaking, a bi-sensory approach is especially important when conveying information.

## Protection targets according to DIN 18040-1

The introduction of the term “protection target” into accessibility planning and barrier-free building indicates a pioneering change in possibilities, and is a creative challenge for planners.

The standard does not define specific solutions but the final outcomes that are to be achieved. As the standard **“[...] applies to new buildings and shall be used for planning modifications and modernisations mutatis mutandis [...]”**, the possibility to achieve the protection targets in existing buildings in different ways is realistic as a reference to current practice.

This Guideline describes the protection targets and solutions of the DIN standard, and also additional potential solutions that are intended as inspiration. In parallel, requirements from other countries are also outlined, as are alternatives that can be found in specialist literature. The photographs of built examples show creative implementations that combine accessibility and *Baukultur*.



## How to use the Guideline

The following distinctions are made in the formatting of each chapter for an easy application of the Guideline:

“Original text of the protection target according to DIN 18040-1”

Protection target according  
to DIN 18040-1

### Headlines as part of the overall outline

Text according to DIN 18040-1

Text according to other legal standards

Reference to standards other than  
DIN 18040-1

Possible solutions according to DIN 18040-1 or other legal standards

Solutions suggested by the authors Explanations  
Comments by authors, special notes, recommendations

Reference to foreign standards,  
other sources

» Reference to other areas of action

Image captioning



Motor impairment, poor physical strength and anthropometry



Visual impairment



Auditory impairment



Cognitive impairment



To be taken into account

- during requirements planning
- during analysis of alternatives for coverage of requirements
- during ACCESSIBILITY CONCEPT – qualification for ES-Bau



To be taken into account for PROOF OF ACCESSIBILITY – compiling EW-Bau



To be taken into account during detailed design phase

# Overall concept

1. Integration into the urban environment ..... 57
2. Orientation and guidance systems ..... 64

ALBRECHTSBURG MEISSEN

# Integration into the urban environment

“Access and entrance areas must be easy to find and provide barrier-free access.”

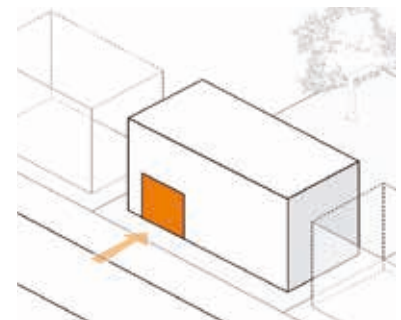
Protection target as defined by  
DIN 18040-1, Chapter 4.2.3 – Access  
and Entrance Areas

## 1.1 Location of access and entrance areas

In the context of a given starting situation in an urban environment, it should be ensured that the main entrance to a building is easy to locate, laid out clearly, and provides simple orientation.

An unambiguous and cogent architectural shape and positioning of a main entrance as part of urban design as well as clear and simple routing are decisive factors.

For visitors, the entrance area is the first impression they have of a building. It should be considered the building's business card and planned with particular care.



Entrance area in high-contrast design

## 1.2 Access and location

Shared routing is to be aimed at for:

- routes for all visitors from the public space or the parking areas up to the main entrance without stairs or thresholds and
- routes for all staff members from the public space and the parking areas up to the main/staff entrance without stairs and thresholds.

Entrance areas may be easier to locate if the entrance is designed with high visual contrasts.

People with sensory impairments will be able to find the entrance and get their orientation if tactile and visual guidance aids are placed in the circulation areas for them to use. These should be embedded into existing barrier-free systems and be part of an overall concept. Furthermore, the distances to be covered should be kept small. In addition to floors with a tactile structure, ground surface indicators can be used (see » chapter 2 on orientation and guidance systems). Acoustic or electronic information may be employed as guidance elements in individual cases.



If no structural solution can be implemented to enable persons with restricted mobility to access a building without assistance, an intercom system and corresponding arrangements for access are permissible as an interim solution. The intercom system shall be accessible and marked in accordance with » Chapter 12 on operational elements and communications systems.

Danger spots such as crossings, stairs and steep ramps must be equipped with warnings and safety markings. All in all, the design should be clear and intuitive and avoid additional risks.

Tactile models and general information systems providing more than hazard prevention information should be included.



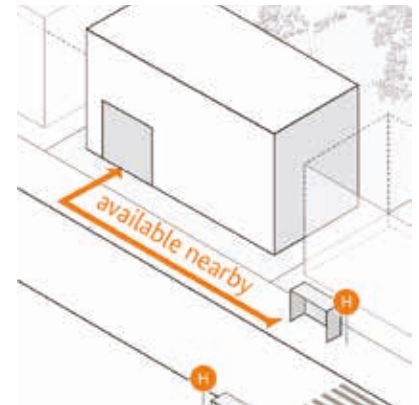
### 1.3 Public transport connections

The buildings should have a barrier-free access to public transport facilities nearby. The instructions on barrier-free access apply (see » chapter 2 on orientation and guidance systems and » chapter 3 on walkways and circulation areas). This means the following elements for access to public transport stops and stations:

- ground level entry
- continuous visual and tactile routing
- visual, and if applicable, acoustic information systems with enhanced contrasts
- dropped kerbs at crossings
- if necessary, check implementation with municipality and public transport operators.

A distance of 100 meters from the parking area to the building is considered reasonable (Implementation Rule on parking spaces, Building Regulation Berlin). When considering the needs of users who rely on public transport, a nearby public transport stop or station shall also be aimed for.

If no accessible stop can be made available, the site/building is not optimally suited for use as a place with a predominantly public function. Should the building be intended not for public use but primarily for workplaces, an agreement has to be reached with the future user and the representative body for people with disabilities as to whether the site/building is suitable for the intended use.



Barrier-free connection to public transport should be available nearby.

**Implementation Rule on Parking Spaces (AV Stellplätze) Building Regulation Berlin, 2007**

Protection target as defined by  
DIN 18040-1, Chapter 4.2.2 – Parking  
Spaces

“Designated parking spaces for people with disabilities need to be marked accordingly and should be located in close proximity to barrier-free access points.”



## 1.4 Private transport connections

A direct connection from the parking space to the main entrance of the building should be ensured, using shared routing if possible for all visitors and employees. The areas where wheelchair users might need to cross the premises should be placed where they are best suited, and coordinated with the desired location of the entrances.

**Parking spaces spanning 3.50 meters in width and 5.00 meters in length should be located near barrier-free access points and clearly marked.**

Parking spaces of 2.00 meters in width may also be possible if additional free space measuring 1.50×1.50 meters is available for getting into and out of the vehicle, such as a walkway.

The barrier-free parking spaces should be marked in such a way as to be visible even in difficult weather conditions (snow), also outside public road environments.

DIN 18024-1:1998-01, Chapter 16

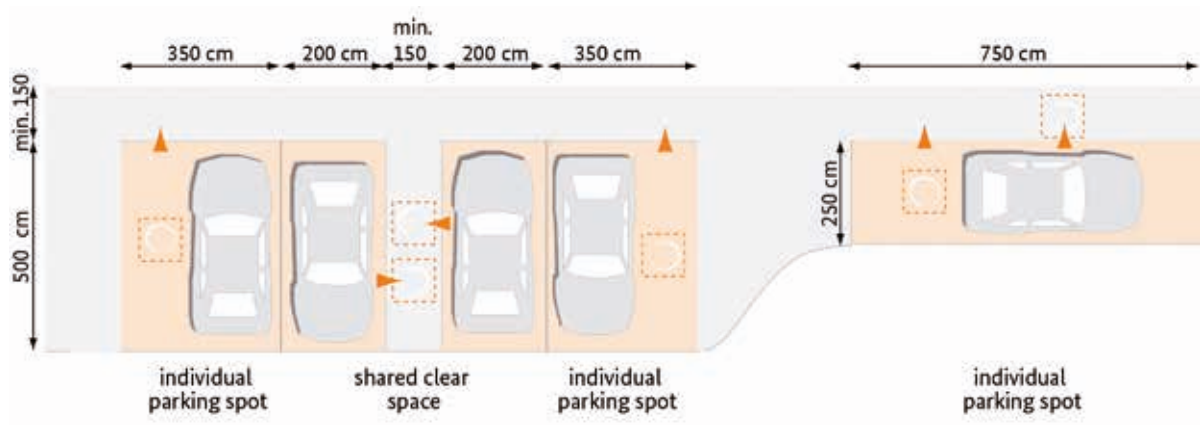
**According to DIN 18024-1, parking spaces for parallel parking need to be 2.50 m wide and 7.50 m long. Parking spaces for vans need to provide a minimum height of 2.50 m and be of a minimum width of 3.50 m and a minimum length of 7.50 m.**

The parking space should meet neighbouring circulation area either at the same level or via a dropped kerb.

The respective Building Regulations or Special Installations Ordinances of the *Länder* define how many parking spaces are required.

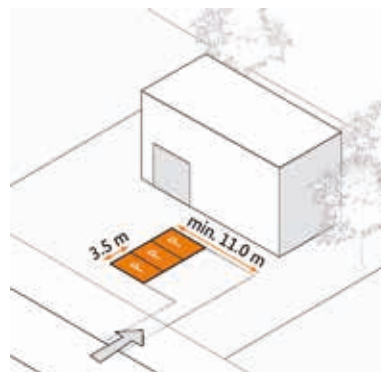
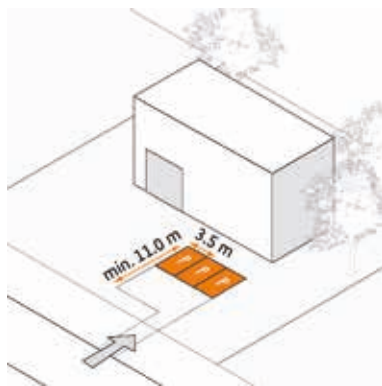
Implementation Rule On Parking  
Spaces (AV Stellplätze) of Building  
Regulation Berlin, 2007

**For public institutions, the Implementation Rule On Parking Spaces of Berlin's Building Regulation stipulates 1 parking space per 200 visitors (a minimum of 1 parking space for 100 visitors), or 1 parking space per 2,000 m<sup>2</sup> gross floor space (1 parking space for 1,000 m<sup>2</sup>).**



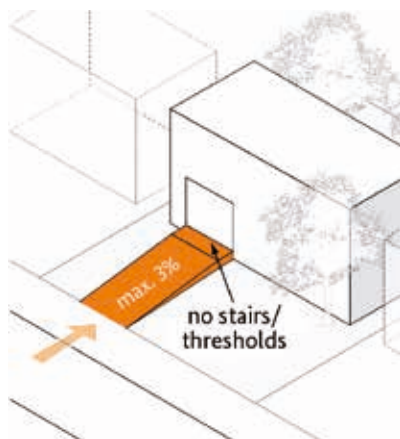
Basic geometry of parking spaces

In case of controlled access gates, a minimum width of 90 cm for wheelchair users needs to be ensured. This area is to be marked for blind or visually impaired people by means of ground elements in high-contrast optical or tactile design.



Space required for parking spaces

Because more time is expected to be needed for getting into and out of a vehicle, parking spaces sheltered from rain (under roofs or in underground car parks) are the preferred option.



Topography for accessibility of entrances

## 1.5 Initial topography

The topography should enable the joint use of the main entrance without stairs or thresholds for every visitor and member of staff and enable shared routing without stairs or thresholds from a public transport stop or station or the parking spaces to the main entrance.

For the given topographic situation, a review should be carried out whether entrances and exits other than the main entrance can also be used step-free, i.e., whether the entire exterior space of a building can be designed accessibly. The latter is obligatory if the exterior space is used not only by the staff during breaks, but also as an escape route, or is intended to be used by visitors (for museums and schools, for instance).

If the topography shows a gradient of less than 3%, step-free routing can usually be implemented without any problems in the future entrance area.

**If access routes are up to 10.0 m long, gradients of up to 4% are feasible (see » chapter 3.2 on gradients of walkways and exterior circulation areas).**

If the gradient is greater than 3%, the impacts of the topography need to be reviewed in the analysis of alternatives in accordance with Clause 2.2.2. Section E RBBau Guidelines. Higher investment costs may ensue.

Lifts are usually the more comfortable solution for existing buildings already equipped with stairs over a height of more than 100 cm (6 to 7 steps) (see » chapter 7 on lifts).



- 1 Entrance area of the convent building at the monastery of Dobbertin (Kloster Dobbertin Mikolaiczky Kessler Kirsten, photo by the Heritage Conservation Office of Mecklenburg Western Pomerania, A. Bötterfür)
- 2 High-contrast marking of parking space – Ehrenbreitenstein Fortress (Büro Topotek 1, Berlin, photo by Hanns Joosten)
- 3 Incline for access to entrance – Thuringian Land Administrative Office Weimar (Hartmann + Helm Planungsgesellschaft mbH)



# Orientation and guidance systems

Protection target as defined by  
DIN 18040-1, Chapter 4.4 – Warning/  
Orientation/Information/Guidance  
and 4.4.1 – Basics

**“Information on building use, such as warnings or orientation or guidance information, needs to be appropriate for use by people with sensory impairments.”**



## 2.1 Need and structure

As a general principle for federal buildings, shared routing for all users is to be aimed for. Orientation and guidance systems are an essential aid for people with sensory or cognitive impairments as well as other users to guide them safely and without confusion from their starting point to their destination. The system to be used should be harmonised and consistent, so that it is easy to understand, thus facilitating comprehension and orientation.

The starting points and destinations and the need for orientation and guidance systems should be identified already early on in the planning process. The measures can be ranked according to a specific hierarchy. Orientation and guidance systems may be designed differently depending on whether people with visual impairments frequent a building on a regular basis or rarely or just on a one-off basis and how familiar they are with the building's structure. If visually impaired members of staff are familiar with the premises, they may require only little support for their orientation. In contrast, for visitor traffic a consistent orientation system should be installed.

If orientation and guidance systems are developed during an early planning phase, a sophisticated design may be developed that matches the overall style. These solutions often do not require ground surface indicators.

**A bi-sensory approach is the basis for conveying information to people with sensory impairments, i. e., information is conveyed using at least two senses. Information may be conveyed in tactile, visual and/or acoustic ways.**

**Designing orientation and guidance systems with high-contrast tactile or visual elements helps people with sensory impairments to notice and use them. Important information and warnings need to be especially prominent and easy to find (» chapter 2.5 on visual perception, materials, and visual contrasts and 2.6 on tactile perception, materials, and tactile contrasts).**

A range of guidance systems may be employed and also combined with one another:

- linear systems, preferably where clear and simple guidance is needed from one point to another. If a guidance system is more complex and covers parallel routes to different destinations, additional supporting guiding elements or good preliminary information must be provided.
- guidance systems from one distinctive point to another make sense when the structures of the building or the exterior space offer a manageable scope and only one point needs to stand out – such as marking an entrance along a long corridor. In this case, the surfaces do not need to be designed with visual contrasts.

## 2.2 Exterior guidance systems



For the exterior of federal buildings the installation of orientation and guidance systems is aimed to extend from:

- existing orientation and guidance systems
- public transport stops and stations, and parking spaces
- property access

up to the entrance points to the buildings. Additional sources of information, such as tactile systems, are also to be included. The transition from the exterior to the interior should be a particular focus. In general, an interruption of orientation systems (e.g. in the vestibule area) is to be avoided (» chapter 15 on entrances and lobbies).

Exterior guidance systems can consist of so-called other guidance elements and/or ground surface indicators (» chapter 2.4 on guidance elements). The guidance element of choice needs to be integrated into an overarching orientation and guidance system, should one be in place already (e.g. on a university campus).

When developing a guidance system, it is important to use guidance elements in a recurring, comprehensible, and unambiguous way, thus facilitating orientation.

Orientation in the exterior space can be facilitated for every user by the following measures:

- clearly structured design
- easily recognisable room structure
- comprehensible routing
- sightlines and openness
- establishing clear orientation points.



## 2.3 Interior guidance systems

For the interior of federal buildings, orientation and guidance systems are to be planned for the stretches between:

- entrance area and information counters
- information counters and vertical access

DIN 32984:2011-10, Chapter 6.3

According to DIN 32984 additional guidance systems need to be provided for the routes:

- between information counters and waiting areas
- between information counters and (accessible) toilets
- from the lobby to rooms open to the public, such as Citizen Centres, centres for assistance, and centres for application and appeals support (in administrative and court buildings)
- to important annexes and branches (in large administrative building complexes)
- between cash desks and cloakrooms in cultural facilities and museums
- within non-public areas/workplaces
- between the entrance area and vertical access.

The guidance systems are to be developed on the basis of the guidance elements described in » chapter 2.4.

A simple basic structure of a building can be crucial for orientation purposes.

Orientation within a building can be facilitated by:

- a comprehensible routing, including straight lines and right angles as much as possible
- sightlines and openness
- clear hierarchy of rooms and spaces
- establishing clear orientation points

Rooms with a width of up to 8 m usually do not require an additional guidance system as outlined in DIN 32984.

DIN 32984:2011-10, Chapter 6.3

## 2.4 Exterior and interior guidance systems



### Advance information – website

Important information on the building and access routes, including public transport, should be made available on an accessible website for people with sensory impairments so that they can inform themselves before they visit a public building.

### Advance information – tactile plans and models

Advance information is the starting point of any orientation system. This can be provided, for instance, in the form of a tactile layout plan. Tactile models can, for instance, be useful for conveying information on historic buildings and monuments.

### Sign posts and labelling

Written information for tactile perception should always be provided both in an embossed pyramid writing style and in Braille. A sans-serif style is to be used for embossed texts. The information is to be installed according to the provisions of the guidelines for tactile writing systems by the German association for visually impaired and blind people (Deutscher Blinden- und Sehbehindertenverband, DBSV). The information will be easier to find if its content is standardised and placed in comprehensible uniform locations.

German association for visually impaired and blind people (*Deutscher Blinden- und Sehbehindertenverband, DBSV*) – Guidelines for tactile writing systems, 2007

### Other guidance elements

Developing orientation and guidance systems is a complex process which needs to be adapted to the specific circumstances. They consist not only of special guidance elements forming a closed system: in the interior space of buildings walls, room dimensions, acoustic conditions, lighting, boundaries such as skirting boards and change of surface material, or readily noticeable pieces of furniture can also serve as guidance elements. In the exterior space, guidance systems can consist of exterior walls, low copings and brick ledges, fences, or drainage elements. Most importantly, the elements need to be easy to comprehend and clearly identifiable.

### **Interior guidance elements**

In interior spaces, the guidance character of the elements can be ensured via tactile or visual information and contrasts.

### **High-contrast design in interior spaces**

The boundaries of rooms are easier to be perceived by visually impaired people when contrasts are used in designing interior spaces. High-contrast skirting boards and doorframes may also be useful.

### **Tactile information on balustrades and handrails**

Tactile information (in Braille, embossed letters, or easy-to-understand symbols) can be incorporated into handrails for the purpose of orientation, such as information on the floor of the building or what routing to follow. These pointers are to be installed on the outer side of the handrail at the beginning and end of ramps and staircases.

It is important to ensure that the handrail pointers are always found on a specific spot on the handrail: for stairs, preferably on the slanted part of the handrail on the right side, directly above the first and last tread. Handrails can also be employed at horizontal levels such as in corridors.

### **Interior zoning**

A range of floor materials with different tactile and visual surfaces can be used for interior zoning as they can for exterior zoning. They can help to delineate obstacle-free movement areas from areas for furniture and opening doors. The wall design can be included as an additional aid.

### **Interior hazard warning surfaces**

Walls in existing buildings can be retrofitted with applied or milled grooves and ridges.

**DIN 32984:2011-10**

The width comprises 3 to 4 ridges. According to DIN 32984, a difference of 2 to 3 mm in height is sufficient for smooth floor surfaces in the interior of buildings to be detected by a long cane.

If possible, the use of ground surface indicators is to be avoided in interior spaces.

### Exterior guidance elements

In exterior spaces, guidance elements can be employed as guiding lines, offering orientation for people with sensory impairments and ensuring consistent tactile detection of paths. Continuous ledges along walls, brick benches, lawn edges, drainage channels, as well as changes in surface materials that are clearly discernible for tactile, visual, and, where appropriate, auditory perception can fulfil that function.

DIN 32984:2011-10, Chapter 5.9.4

When high-contrast tactile ground structures are used, the changing of materials must be recognisable as a consistent guiding line. Recognition can be ensured when different materials and surface finishing are used (» chapter 2.5 on visual perception, materials, and visual contrasts, » chapter 2.6 on tactile perception, materials, and tactile contrasts).

DIN 32984:2011-10, Chapter 5.1



Examples of guiding lines in exterior spaces

The consistency of guiding lines must not be harmed by fixtures or temporary utilisation, such as temporary furnishing or signage.

DIN 32984:2011-10, Chapter 5.9.4

### Zoning of exterior open spaces

Large open spaces such as squares or paths wider than 8 m may be difficult for the orientation of people with sensory impairments.

DIN 32984:2011-10, Chapter 5.9.5

Structuring these areas in areas for moving (movement areas) and common areas is beneficial for the orientation of people with sensory disabilities, and at the same time for all other users.

Movement areas should be free of fixtures and obstacles. Furniture is to be envisaged exclusively for common areas. On both sides of movement areas, a 60 cm-wide segment of the common area should be kept free of fixtures and obstacles to the extent possible and serve as a safety strip.





movement area | safety strip | common area

Surfaces in movement and common areas should be designed with tactile, visual, and, where appropriate, acoustic contrasts to ensure their function for guidance and warning (» chapter 2.5 on visual perception, materials, and visual contrasts and » chapter 2.7 on auditory perception).

A high-contrast design of common areas, as well as their fittings and fixtures and important orientation points, makes them easier to recognise. Selective orientation elements can be placed along paths to aid orientation, and in special case they can make visual high-contrast ground surfaces superfluous.

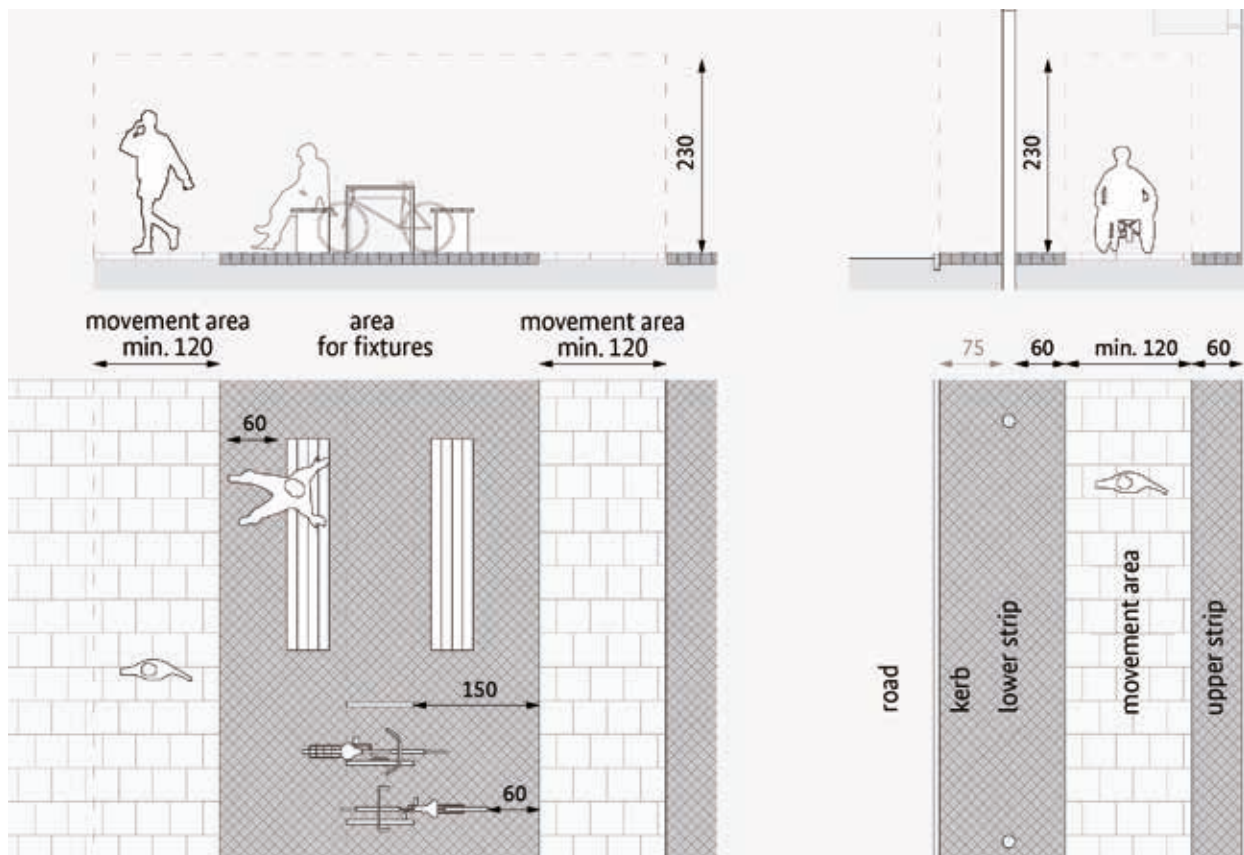


Illustration left: example of structuring an open space, i.e., of an area with mixed traffic, including access routes and common area.

Illustration right: zoning paths with upper and lower strip; for information on required dimensions for walkways and circulation areas see » chapter 3 on walkways and circulation areas.



### **Zoning areas with car and deliveries traffic**

Depending on the traffic volume and when one type of traffic is to be given priority it may become necessary to create a safety distance and separate the access routes for cyclists or cars or deliveries from access routes for pedestrians and wheelchair users.

The width of the safety distance (50 cm minimum) depends on the traffic volume. If the traffic areas do not differ in level, an additional dividing strip with visual and tactile contrasts of a width of 30 cm may become necessary, should the risk potential be high.

DIN 32984:2011-10, Chapter 5.9.3

This can be achieved, for example, when pavements next to roads boast an upper strip and a lower strip with the walkway in the middle (» figure page 70 right). Upper and lower strips need to be designed with visual and tactile contrasts to the walkway. By doing so, common areas and safety distances to adjacent types of use can be clearly delineated and at the same time consistent and comprehensible guidance elements are offered.

DIN 32984:2011-10, Chapter 5.9.3

### **Exterior kerbs**

Kerbs are used to differentiate safe access routes from hazardous areas such as roads. Kerbs designed with tactile and visual contrasts are therefore an important orientation element and a guiding line for the longitudinal orientation of people with sensory impairments in exterior spaces. As exterior delineation elements, kerbs should preferably be designed with a minimum height of 6 cm, and have a clearly detectable edge in visual contrast to the surface and no pronounced rounding to ensure optimal recognition by long cane users.

DIN 32984:2011-10, Chapter 5.9.2

Kerbs higher than 3 cm placed in movement areas generally constitute an obstacle for wheelchair users. They need to be lowered to that height at crossings. For safe pedestrian and wheelchair use, it is beneficial to have step-free transitions if possible and as much level ground as possible. This is a reason why using kerbs in designing squares, walkways, and streets on the premises of federal buildings should be considered with care.

### **Zoning of paths in exterior public green areas**

Boundaries between a path's surface and a planted area can be used as guidance elements for people with sensory impairments.

**DIN 18040-1 recommends a height of 3 cm for kerbs and a visual contrast to the surrounding surface to make them easy and safe to find.**

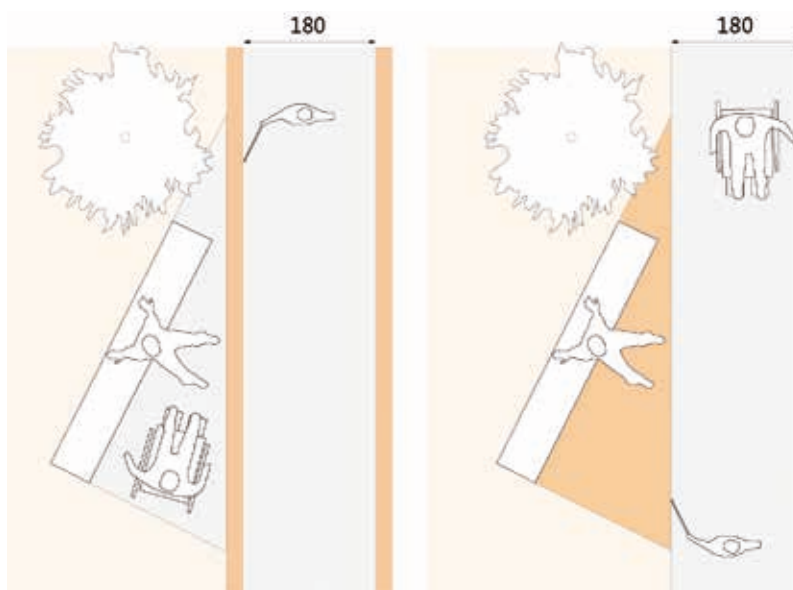
As a boundary to planted areas, kerbs of 3 cm have a negative impact with regard to a sustainable design for exterior spaces because they impede surface water from draining and seeping into adjacent planted areas. They are not well suited for zoning paved areas because they are a risk for people with motor impairments who may trip over them, and they may already constitute an obstacle for wheelchair users.

If paths in public green areas have a visually and tactilely contrasting design compared to surrounding planted spaces, the difference in surface between path and vegetation can be recognised by people with sensory impairments and thus used as a guidance element. Adjacent common areas should be designed in accordance with the zoning scheme in a different tactile and visual design. Additional fixtures such as lampposts should not be placed on the paths but on the green areas or on a side strip recognisable for visual and tactile perception.

Accessibly designed fixtures (see » chapter 11 on interior and exterior furniture and fixtures) can be used in open, square-like spaces according to the same principle as other distinctive points when their design provides sufficient contrasts.

Left: example of a path designed with side strips in tactile and visual contrasts and an adjacent common area on one side

Right: common area designed in tactile and visual contrasts. The transition between path and vegetation/common area is recognisable as a guiding line.



### Exterior ground surface indicators

Ground surface indicators can be used as guidance systems if no consistent orientation and guidance system can be implemented using the guidance elements for exterior spaces described in this chapter. They can also be used in cases of hazardous or poorly visible locations. Ground surface indicators consist of a standardised sequence of structural ground elements with a high tactile, visual, and where appropriate, acoustic contrast to the surrounding flooring.

DIN 32984:2011-10

Ground surface indicators convey unambiguous information using few, clearly defined structures that can be perceived with the help of a long cane.

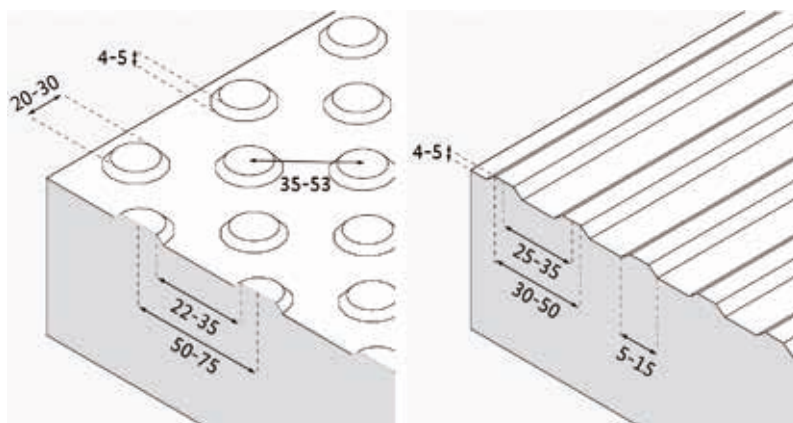
DIN 32984:2011-10, Chapter 4.2

There are two types of ground profiles:

- ribbed slabs as guidance strips within paths and for orientation in the surrounding space or to show direction
- studded slabs to indicate hazardous situations, as hazard warning surfaces or to indicate situations requiring a decision.

For safety reasons, ground surface indicators may not be installed on streets and roads.

DIN 32984:2011-10, Chapter 5.1



Dimensions of ribbed and studded slabs for exterior spaces. In interior spaces unexpected raised surfaces can easily cause tripping. Should an application of ground surface indicators be planned, flatter studs and ribs (2 to 3 mm) are to be taken.

Depending on what function the indicators are to have, DIN 32984 offers a range of solutions for different applications. Guidance strips and hazard warning surfaces are described here; more information on hazard warning surfaces can also be found in » chapter 6.4 on orientation aids on stairs and single steps.

DIN 32984:2011-10

DIN 32984:2011-10, Chapter 5.2.1

**Exterior guidance strips**

Guidance strips consist of ribbed slabs running in the direction of pedestrian travel; they serve as guidance along a path. The ribbed slabs should be 30 to 60 cm wide. A distance of 60 cm is to be maintained on both sides of the strip to the edge of roads or fixtures such as lampposts, sculptures, and such like. As an alternative to guidance strips, other guidance elements can be used to design guiding lines (see graph below).

DIN 32984:2011-10, Chapter 5.2.1

Guidance strips should be installed at a distance of 120 cm to fixtures such as benches, as their use requires more space. At bicycle stands, a distance of 120 cm is to be ensured from the maximum parking position of the bicycle.

DIN 32984:2011-10, Chapter 3.1.2.6

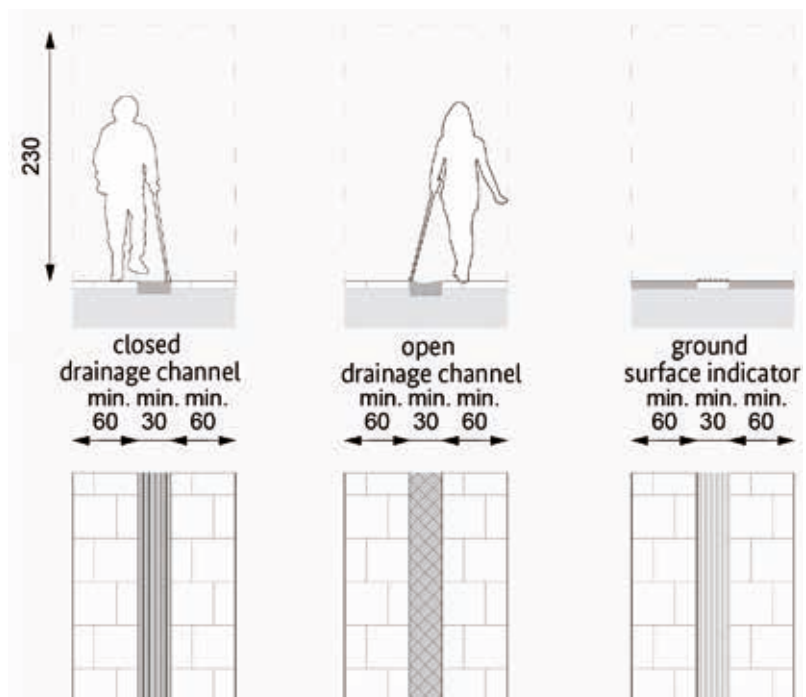
The headroom above the movement area (guidance strip with movement spaces of 60 cm on both sides) must be a minimum of 230 cm.

**Exterior hazard warning surfaces**

Hazard warning surfaces point out a change of level and other hazards and obstacles. They consist of studded slabs and are placed where heightened attention is required.

Examples of the use of ground surface indicators and alternative solutions with other guidance elements  
(» exterior guidance elements)

Visual and tactile contrasts also need to be taken into consideration when using other guidance elements  
(» chapter 2.5 on visual perception, materials, and visual contrasts).



## 2.5 Visual perception, materials, and visual contrasts for interior and exterior spaces



### Visual contrasts

Visual contrasts play a crucial role for detecting elements in interior and exterior spaces. The detectability of stairs, fixtures, parking spaces, and orientation systems for people with sensory impairments is based mainly on visual and tactile contrasts (chapter » 2.6 on tactile perception, materials, and tactile contrasts).

Elements envisaged for providing guidance should feature a visual contrast to their surrounding environment.

The element fulfilling a guidance function should be of a light colour material because light colours can be recognised better by people with poor eyesight.

Detectability usually increases with the intensity of the contrast. However, maximising contrasts does not automatically generate better recognition as it becomes harder to distinguish between important and unimportant information. The contrasts should be appropriate for the individual situation and the specific application.

**Specular reflection is to be avoided.**

Warnings should always be marked more prominently than guidance elements. Especially in complex traffic situations, such as heavily frequented transitions between interior and exterior spaces or when other traffic flows are crossed, particularly clear contrasts may be required. Floorings should exhibit a visual contrast to furnishings and fixtures in order to improve orientation.

**The contrasts need to be permanent and stable. Weathering and pollution are to be avoided and, where necessary, remedied (see also » chapter 2.6 on tactile perception, materials, and tactile contrasts).**

DIN 32984:2011-10, Chapter 3.1.2.6

DIN 32975:2009-12, Chapter 4.3.3.1

**Luminance contrast**

An object's difference in brightness from its surrounding as perceived by the human eye is called the luminance contrast. Luminance contrasts can be utilised for establishing visual contrasts.

Colours can support the perception of luminance contrasts but cannot be substituted for it.

It is important to note that some surface materials in exterior spaces change their colour and brightness with moisture. Luminance contrasts should be ensured in all weather conditions. (see also » side note page 78).

DIN 32975:2009-12, Chapter 4.2.2

**Luminance contrast in guidance elements**

A sufficient luminance contrast is achieved when areas next to one another display a luminance contrast ratio greater than 0.4 in absolute terms.

The required luminance contrast may vary depending on the specific building task. A large light-coloured and smooth material used on access routes in an exterior space may cause too much reflection when the sun is shining, thus causing a discomforting blinding effect.

Furthermore, overly high contrasts may be confusing to people with cognitive impairments (such as people suffering from dementia).

DIN 32975:2009-12, Chapter 4.2.3

**Illumination may also play an important role when selecting luminance contrasts of materials. Ensuring good lighting conditions can have a significant impact on the contrast ratio.**

A decision on luminance contrasts should be reviewed and developed in relation to the specific project. Their impact on the overall design and *Baukultur* should be taken into account, especially for existing buildings.

**Luminance contrasts for ground surface indicators**

According to DIN 32975, Chapter 4.2.2, the absolute value of luminance contrasts should also be at least 0.4 for ground surface indicators. Additionally, the lighter coloured material used in the combination: ground surface indicators and surrounding surface should exhibit a reflection degree of at least 0.5.

DIN 32975:2009-12, Chapter 4.2.2

The reflection degree indicates how much of the incident light is reflected. Only very light colours fulfil the required reflection ratio of 0.5. This is why ground surface indicators are mostly white.

This restricts the range of possible materials to select from and can lead to unsatisfying results with regard to the overall design and *Baukultur*.

This requirement is therefore to be applied exclusively in especially hazardous situations

**Luminance contrasts for stairs and ramps**

Information on the contrasts to be used for stairs and ramps can be found in separate chapters (see » chapter 5.4 on orientation aids at ramps and » chapter 6.4 on orientation aids on stairs).

**Luminance contrast for warnings**

A luminance ratio of 0.7 is required for displaying information on hazards, warnings, and any written information.

DIN 32975:2009-12, Chapter 4.2.2

## Side note

The following overview shows exemplary values of luminance ratios for a selection of natural stones of German origin which may also be used for exterior spaces.

A luminance camera was used for taking measurements under practical conditions (indirect sunlight) but not adapted for standardisation. They were carried out as benchmark measurements at the Technische Universität Dresden (specialisation area Landscaping in collaboration with the Perception Lab/Light Technology at the Traffic and Transportation Psychology Chair).

Due to the measurement conditions and the natural stones' variations in colour, the ratios provided serve only as a rough point of reference. Should a standard-conform proof be required in a specific case, these measures cannot be substituted for this proof. It has become clear that some combinations of materials are likely to reach a luminance ratio of 0.4. This luminance ratio is required for other guidance elements and can be fulfilled with various combinations of natural stone materials. In contrast, the minimum reflection ratio of 0.5 may be present only in very few material combinations.

Almost every material changes its brightness when wet. In many cases, this drastically reduces the luminance contrast. As a matter of principle, the luminance contrast of the materials used should be analysed in samples under dry and wet conditions.

\* The ratios offer a rough reference and can be significantly different in practice. Should a standard-conform proof be required in an individual case, these measures cannot be substituted for this proof. Standardised tests can be carried out in accordance with DIN 32984 Item 4.3.3.2 on the identification of luminance contrast by measuring the luminance and the reflection ratio under laboratory conditions. These tests are offered by specialised laboratories and universities.







## 2.6 Tactile perception, materials, and tactile contrasts for interior and exterior spaces

The surfaces of paths and circulation areas must be even and solid so that people with motor impairments (such as wheelchair users) can use them safely and without any problems in all weather conditions.

The broad range of possible materials for interior and exterior spaces can be integrated into accessibility design concepts. The flooring should have surfaces boasting tactile and visual contrasts to surrounding structural components to improve orientation within a room (see » chapter 2.5 on visual perception, materials, and visual contrasts).

DIN 32984:2011-10, – Chapter 5.9.1

### Materials and tactile contrasts in exterior spaces

All the materials customarily used for constructing paths are suited for use in orientation and guidance systems, with the prerequisite that their surface properties be adapted to the intended function. A tactile contrast can be achieved when the surfaces selected are of varying materials and processes, as well as the width and direction of joints.

DIN 32984:2011-10, – Chapter 4.3.2

The tactile requirements for such surface design apply both to guidance elements and ground surface indicators: the structures need to be safely detectable by a long cane and, if possible, also when walking on them. The different materials are built in flush with one another as to avoid edges that may cause tripping.

As a general rule, smooth and large formats are suited for access routes, while rougher and smaller ones are better for common areas. Pavement surfaces that are rich in joints or chamfered may reduce the detectability of guiding lines. (see » chapter 2.4 on guidance elements).

Sawn stone pavement (left) and rough stone pavement (centre), example of path zoning using natural stone paving and slab surfaces (right)



function	basic principles for surfaces	colour	suitable materials	surface	notes
<b>access routes</b>	even sturdy large formats	light, diffuse reflection	slabs and cobblestone made of natural stone or concrete clinker paving concrete surfaces coloured or split mastix asphalt surfaces water-bound surfaces	<b>natural stone:</b> hammered, flame-finished, rough-cut, sandblasted <b>concrete:</b> polished*, finely blasted, finely sanded  * only a rough polish achieves the SRT values necessary for exterior spaces	low number of joints, joint direction changes towards surfaces of common areas, upper and lower edges
		dark, low reflection	slabs and cobblestone made of natural stone or concrete clinker paving concrete surfaces asphalt surfaces water-bound surfaces	<b>clinker:</b> untreated, peeled, finely sanded	
<b>common area/ surrounding area/additional area</b>	small formats, rough	light	natural stone paving concrete paving clinker paving water-bound surfaces	<b>natural stone:</b> naturally rough, rough, hammered <b>concrete:</b> roughly washly, roughly hammered	high number of joints, joint direction changes towards movement area surface
		dark	natural stone paving concrete paving clinker paving water-bound surfaces lawn	<b>clinker:</b> roughly sanded, rough hand-finish	

### Materials and tactile contrasts in interior spaces

The broad range of possible materials for interior spaces is to be included in accessible design concepts. When used on floors, walls, handrails, and furnishings, the varying haptic qualities of the materials can be made detectable by long cane, hands, and feet.

Even relatively small but well thought-through changes in material can contribute to a self-explanatory zoning of an interior space, e.g. varying floor constructions with the same upper material may be perceived as very different from each other. Areas exhibiting complex patterns can be confusing and should therefore be used only with caution.

### Exterior anti-skid surfaces

DIN 18040-1 stipulates Assessment Group R 9 for skid-resistant surfaces of floors in interior spaces (see » interior anti-skid surfaces).

There are no special instructions for measuring skid resistance in exterior spaces. As changing weather conditions can result in heightened hazards due to moisture, a value of R 10 and R11 (analogous to ASR A1.5/1.2) should be planned for.

The table is intended to facilitate the selection of surface combinations that can be visually or tactilely perceived. Materials consisting of concrete and natural stones can be used for both movement and common areas. Clearly detectable tactile and visual contrasts are crucial (see also » chapter 2.5 on visual perception, materials, and visual contrasts). Suitable surface materials should be chosen so as to ensure a tactile as well as a visual contrast between traffic areas and common areas.

See also ASR A1.5/1.2

### Specification Sheet on Skid Resistance of Pavement and Slab Surfaces for Pedestrian Travel

Skid resistance in exterior spaces is traditionally defined on the basis of micro- and macro-roughness. The “Specification Sheet on Skid Resistance of Pavement and Slab Surfaces for Pedestrian Travel” (Merkblatt über den Rutschwiderstand von Pflaster- und Plattenbelägen für den Fußgängerverkehr) provides information on the skid resistances of different surfaces directly after they have been placed and after 12 months of use.

surface	average value micro-roughness ≤ 1 year	average value micro-roughness ≥ 1 year	time of efflux macro-roughness ≤ 1 year	time of efflux macro-roughness ≥ 1 year
concrete paving	59.0	65.9	2–30	2–106
natural stone paving	62.3	47.3	2–15	5–600
clinker paving	59.8	46.2	31–87	26–500
concrete slabs, unpolished	64.6	56.2	3–19	2–43
concrete slabs, polished	44.8	51.7	>1,000	>1,000
natural stone slabs, unpolished	67.1	49.8	2–11	7–180
natural stone slabs, polished	29.8	34.0	>1,000	>1,000

The table shows measurements of a range of surface materials. The micro-roughness should be at a value of 55 and higher (SRT value). A macro-roughness (AM value) greater than 40 can compensate to some extent for a deficit in micro-roughness. Micro-roughness (SRT measurement) and macro-roughness (AM measurement) of floor surfaces as defined by the Road and Transport Research Association (*Forschungsgesellschaft für Straßen- und Verkehrswesen*, FGSV) 1997

The extensive range in the micro-roughness of natural stone surfaces can be explained by the great variety of material properties and processing methods. Flame-finished, hammered, or sandblasted surfaces, depending on the type and shape of the natural stone used, usually exhibit the skid resistance value required for exterior spaces.

The skid resistance of clinker and concrete products can be improved by micro-rough structures that are incorporated into the surfaces during manufacturing.

#### Skid resistance in interior spaces

When designing the surface of floors, it is important to adhere to the Assessment Groups corresponding to the respective skid hazard. R 9 as stipulated by ASR A1.5/1.2 is for the most part sufficient in interior spaces. The requirements for sanitary rooms, kitchens, and specific work areas range between Assessment Groups R 10 and R 13.

**Specular reflections and blinding effects should be avoided.**

Floor surfaces that have a smooth and slippery appearance may be a hazard because of their psychological effect.

See also ASR A1.5/1.2

## 2.7 Auditory perception



Acoustic information and voice communication must be provided in such a way as to be perceived by people with auditory impairments. For this to be the case, it is necessary to fulfil basic acoustics prerequisites.

Optimum room acoustics are the result of the interaction among room geometry, room size, room characteristics, and the total background noise level.

DIN 18041:2004-05

Taking into account the size of rooms and the distance from where voice communication or other acoustic signals originate, rooms are divided into

DIN 18041:2004-05

- rooms with auditory communication over medium and greater distances (conference halls, court rooms, council chambers, banqueting halls, class rooms, seminar and meeting rooms, university lecture halls, group activity rooms, sports and swimming halls). Small rooms with a volume of about 250 m<sup>3</sup> usually do not require additional sound systems, whereas these are necessary for medium-sized and small rooms with volumes of about 250 to 5,000 m<sup>3</sup>.
- rooms with auditory communication over small distances, such as restaurants, cellular offices, offices for use by more than one person, open-plan offices, reading rooms and circulation counters in libraries, lobbies, exhibition halls, and staircases.

### Noise level

The difference between wanted signals and background noise must amount to at least 10 dB to ensure accessible perception. The aim should not be to enhance the wanted signal, but, if possible, to reduce background noise. The sound pressure level of background noise due to structural circumstances should not exceed 30 dB, as otherwise people with auditory impairments will not be able to understand communication over greater distances (5 to 8 m) and will have problems understanding complex texts or texts in foreign languages. The background noise level may be minimised by reducing the following factors:

DIN 18041:2004-05

- exterior noise (by installing new windows, positioning the room adequately within the building, and implementing structural noise insulation measures in accordance with DIN 4109)
- background noise from the audience (reducing the noise of moving chairs)
- background noise emanating from technical equipment, e.g., by using low-noise products in working rooms.

Ensuring a room acoustics quality appropriate for the specific type of utilisation of the rooms is an important criterion, even within the assessment system for sustainable building. The requirements of the technical profile of the Assessment System for Sustainable Building (*Bewertungssystem Nachhaltiges Bauen*, BNB) for office and administrative buildings BNB\_BN 3.1.4 correspond to the following level of detail.

DIN 18041:2004-05

**Room size and room geometry**

Room geometry influences room acoustics. When no acoustic measures are envisaged, round, elliptical, and certain trapezoid shapes of rooms are to be avoided. The same is true for concave walls and ceilings. In addition to room geometry, the properties of the walls and the ceiling influence the direction and control of sound waves in rooms.

It is important to ensure that the path length difference between the direct sound that is generated in the sightline to the sound's source and the sound that is reflected from walls or the ceiling is less than 17 m. This is accomplished when the surface of walls that are farther than 9 m away from the sound's source are designed to improve room acoustics. Parallel walls are to be avoided in rooms where music is presented. The proportions of the length and the width of the room compared to its height are to be maintained, and overly low ceilings avoided.

DIN 18041:2004-05

**Reverberation time**

Acoustics can be improved by means of low reverberation times. Information on the ideal maximum reverberation time in relation to room size and room utilisation can be found in DIN 18041:2004-05. Moreover, for the benefit of people with auditory impairments and/or cognitive impairments and for communication in a language other than one's native language, the aim should be to achieve a sound reverberation time 20% lower than that stipulated here.

DIN 18041:2004-05

**Sound absorption measures**

Sound absorption measures are required to achieve appropriate sound acoustics, even in rooms with speech communication over short distances.

**Acoustic guidance systems**

Orientation and guidance systems can also consist of auditory elements. Acoustic guidance can be provided, for instance, by changed sounds when walking or tapping the ground with a long cane. Using acoustic spots (fountains, music, signals) is another possibility. They can constitute a guidance system by being used in a sequence of guidance elements or complementary to other systems. Additionally, audio and video guides as well as a variety of personal radio systems are part of accessible guidance systems.

The use of acoustic guidance systems is essential for alarms and warnings (see » chapter 9 on emergency alarm and evacuation and » chapter 20 on sanitary installations).





1 Design of a tactile paving system for the blind – State Theatre of Darmstadt (modifications planned by +Ragnarsdóttir+Oei, CBF tactile paving system, photo by Barbara Aumüller)

2 Advance information – Dresden Hygiene Museum

3 Floor markings – Federal Environment Agency Dessau (sauerbruch hutton architekten, ST raum a Landschaftsarchitekten, photo by Markus Bredt)



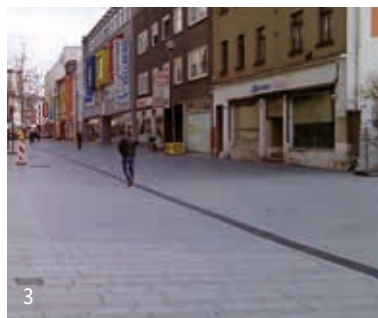


1, 2 Zoning principle for movement and common areas – Warburg (Lohaus Carl Landschaftsarchitekten)

3, 4 Movement areas with drainage channels in visual and tactile contrasts – Bergisch-Gladbach pedestrian zone ([f] landschaftsarchitektur)

5 Guidance using other guidance elements such as hedges and edges of house walls – Wollmarkthof Augsburg (Topotek 1, Berlin, Hanns Joosten)

6 Kerbs as guiding lines and placement of lamps outside access routes – River promenade at Konrad Adenauer Ufer (RMP Stephan Lenzen Landschaftsarchitekten)





## 2.8 Exterior illumination



Consistent basic illumination is required for any time of day or night and all weather conditions to ensure safe detectability. It is the basis without which the luminance contrasts described in » chapter 2.5 on visual perception, materials, and visual contrast cannot work.

The material, illumination method and light intensity need to be coordinated during the development so that blinding effects and specular reflections are ruled out.

The colour of the light used needs to be coordinated with optically contrasting elements that may have already been installed for warning and guidance.

Lamps must not become obstacles and therefore need to be designed according to the rules for fixtures and furnishings (see » chapter 11 on interior and exterior fixtures and furnishings). They should be installed outside access routes or safety zones.

### Access routes

Access routes should have consistent good-quality illumination to ensure a clear recognition of paths.

### The illumination of traffic areas is regulated in DIN 13201-1.

DIN 13201-1:2005-11

It is not recommended to apply this standard to access routes for wheelchair users and pedestrians as the standard applies to areas of motorised traffic. Rigid application may in some cases result in overly intense illumination.

Maximum brightness does not ensure optimum visibility. The illumination needs to be adapted to the individual situation and, if necessary, tested in sample lighting in situ as to take into consideration the influence of the material's colouring and of surrounding wood plants and fixtures.

Orientation is supported by placing individual lamps in a straight line along the path in a regular sequence.

An international comparison has revealed that the illumination of ramps is a general requirement (BBR 2009).

### Stairs and ramps

Important areas as well as dangerous or complex traffic situations (crossings, stairs, ramps) require additional accentuation. It is important to ensure that they are detected early. Contrasts need to be permanently perceivable (see also » chapter 2.5 on visual perception, materials, and visual contrasts).

The formation of shadows is to be reduced to a minimum because shadows can cause contrasts to be perceived incorrectly. The formation of hard shadows on stairs is to be avoided in particular.



## 2.9 Interior illumination

The illumination of rooms depends on their use. Flexible and cost-efficient lighting systems are to be preferred.

**Illumination should be free of blinding effects and shadows.**

Illumination requirements vary greatly. Much higher nominal light intensity (greater than 1,000 lux) may be required for people with visual impairments, but also for those with auditory impairments. This is why it makes sense to enable more than one setting so that the light intensity can be adapted to the use at a given time.

Greater light intensities are also required in workplaces:

- when employing older staff as compared to younger staff for the same visual task
- when adjacent areas show stark light-dark differences
- to accentuate accident black spots.

Spot lighting can contribute to structuring a room and to marking priority spots.

ASR A3.4

**Stipulations on the illumination of workplaces can be found in ASR A3.4.**



1 Illuminated guidance strips on handrail – Nauener Platz Berlin (Planung.Freiraum Lichtplanung Studio Dinnebier, photo by Andreas [FranzXaver]Süß Fotografien)

2 Guidance system consisting of illuminated arrows and floor dots – Mercedes Benz Museum Stuttgart (knoll.neues.grün)

