When is an emergency lighting system required?

Eaton’s CEAG Emergency Lighting Business

Building Legislation
Occupational Safety

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Criminal code § 319  Construction hazard

• (1) Anyone who breaches the accepted and recognised rules of engineering in the planning, management or execution of a construction or demolition of a structure/building, and thereby endangers injury or the life of other people shall be punished with imprisonment up to five years or a fine.

• (2) Anyone who breaches the accepted and recognised rules of engineering in practising a profession or trade in the planning, management or execution of a project to install technical equipment in a structure/building or the changing of installed equipment of this type, and thus endangers injury or the life of other people, will be punished likewise.

Germany
Occupational Safety // Building Legislation

Emergency lighting

Occupational Safety
- ASchG
- ArbStättV
- ASR A1.3
- ASR A2.3
- ASR A3.4/3

Building Legislation
- MBO
- MVStättV
- MVkVO
- MBeVO
- MGarVO
- MHHR
- MSchulbauR
- MKhBauVO
- M-FIBauR
Occupational Safety
Occupational Safety

Occupational Safety and Health Act (ArbSchG)

ArbSchG § 5 Assessment of Working Conditions

• (1) The employer shall determine which procedures of Health and Safety are required by an assessment of the risks faced by Employees in the workplace.

ArbSchG § 6 Documentation

• (1) The employer must possess the necessary documents about every type of activity and the number of employees, from which the results of the risk assessment are evident, including the defined actions of Health and Safety.
Workplace Ordinance (ArbStaettV)

- This regulation serves the implementation of the EC Council Directive 89/654/EWG from 30th November 1989 concerning the minimum Health and Safety requirements for Workplaces.

1.3 Health and Safety identification signs

- (1) Health and Safety signs are unaffected by the following requirements if the risks to Health and Safety cannot be avoided through technical or organisational measures or are sufficiently limited. The results of the risk assessment are to be considered.
Workplace Ordinance (ArbStaettV)

2.3 Escape Routes and Emergency Exits

• (1) These shall be equipped with emergency lighting if the safe evacuation of all employees is not otherwise guaranteed, especially in the case of a failure of general lighting.

3.4 Illumination and line of sight

• (3) Workplaces, in which workers are exposed to accident hazards during failures in general lighting, must have emergency lighting.
Occupational Safety

Workplaces Regulations (ASR)
Specifying the requirements for Health and Safety signs in the workplace. Observing the technical rules the employer can be expected that the corresponding requirements of the regulation are satisfied.

- ASR A1.3 Health and Safety Signs
- ASR A2.3 Escape routes, emergency exits and rescue plans
- ASR A3.4/3 Emergency lighting, optical safety management system
Occupational Safety

ASR A1.3: Safety and Health Protection Signage

ASR A1.3 is the national implementation of directive 92/58/EEC on the minimum health and safety sign requirements in the workplace.

![Safety signages](image-url)
ASR A2.3: Escape Routes, Emergency Exits, Escape and Rescue plans

Escape routes shall be equipped with emergency lighting, if general lighting is not guaranteed during a blackout/ouage, leaving the workplace in darkness.
Escape lighting may/can be required, for example in the workplace

• With large workforce, many floors in the building, areas with increased risk or unclear escape route guidance.

• Areas used by people unfamiliar with the layout

• Large areas that must be entered and walked across (for example warehouses, large offices or sales areas)

• Areas without daylight, such as rooms below ground level
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ASR A3.4/3: Emergency Lighting, Optical Safety Management Systems

• **Emergency lighting** is lighting that provides safe exodus/evacuation from the workplace and prevents accidents that may occur due to the failure of general artificial lighting.

• **Optical safety control systems** are continuous control systems that claim to provide a safe escape route by means of optical markings and directions.

Optical safety management systems are not a substitute for the required high-mounted escape signs and emergency lighting.
Occupational Safety

ASR A3.4/3: Emergency lighting for escape routes

Requirements for escape routes:

- Illuminance min. 1 Lux
- Uniformity < 1:40
- Colour rendering index Ra ≥ 40
- 100% required after 15 seconds
- Rated operating time min. 1h
- Applies for 1st and 2nd escape route
ASR A3.4/3: Emergency lighting for accident hazards

Requirements during accident hazard/emergency:

- Illuminance 10% of the general lighting (min. 15 Lux)*
- Uniformity < 1:10 (EN 1838)
- Colour rendering index Ra ≥ 40
- 100% required after 0,5s
- Rated operating time equal to the duration of accident risk minimum

*In workplaces in which a failure of the general lighting and subsequent hazards may occur, the illuminance of emergency lighting shall be determined on the basis of the risk assessment.
ASR A3.4/3: Emergency lighting for accident hazards

- Laboratories
- Workplaces that must be kept dark for technical reasons
- Hot baths or casting pits
ASR A3.4/3: Emergency lighting for accident hazards

• Laboratories, when it is necessary that employees stop or interrupt running experiments/processes to prevent acute dangers to employees and third parties. Such acute dangers may cause explosions or fires, as well as the release of pathogens, highly toxic or even radioactive materials.

• Workplace that must be kept dark for technical reasons

• Workplaces near hot baths or casting pits that cannot be secured by railings or fences for technical production reasons.
ASR A3.4/3: Emergency lighting for accident hazards

• Long running Equipment

• Pits without covers

• Control rooms / Control centres

• Electrical working areas/service rooms and areas for building services
ASR A3.4/3: Emergency lighting for accident hazards

• Areas containing long-running equipment without moving parts that could however cause accidents in the event of light failure, for example a flat turning lathe.
• Areas near work pits, that cannot be covered for workflow-related reasons.
• Electrical operating areas and rooms for building service installations, that must be entered during a failure of general lighting.
• Control devices for continually monitored systems, such as switch rooms and control centres for power plants, chemical and metallurgical operations, as well as workplaces with control equipment that must be operated under normal service conditions or in case of malfunction in avoidance of accident hazards, to interrupt or even end production process safely.
ASR A3.4/3: Emergency lighting for accident hazards

- **Construction sites**, if a minimum illuminance of 1 lx is not guaranteed in inclined daylight and the employees can not safely exit/evacuate the workplace. Buildings with a basements in which daylight shines in during working hours are not affected.

- During **underground construction work** (e.g. tunnelling works), emergency lighting of 15 lx is required in the work area.
Building Legislation
Building Legislation: Basic Principle

• Working personnel can be found in all buildings. Thus, the minimum requirements for emergency lighting for the workplace must be observed.

• If two or more guidelines or regulations apply to a building, then the highest level requirement shall be applied.
Building Legislation

MBO: Part one §3 (1)

- (1) Equipment/systems shall be designed, constructed, modified and maintained, so that public safety and order, especially life, health and natural resources, are not endangered.

The requirements may vary in individual projects depending on the state, building codes, building certificate and approved fire protection plan.
Building Legislation

Regulations and Guidelines are available for:

- Workplaces
- Places of Assembly
- Shopping Areas
- Accommodation
- Car Parks
- Educational buildings
- Hospitals
- High-rise buildings
Model Regulation Governing Places of Assembly

The MVStättV applies to the construction and operation of:

- Congregational buildings with assembly areas either individually or together hold > 200 People
- Assembly areas outdoors with scenery areas and stands for > 1000 People
- Sports stadiums and leisure sports facility with stands for > 5000 People
Model Regulation Governing Places of Assembly

The number of visitors is as follows:

• **For seating at tables:** one visitor per m\(^2\) of the floor/surface area of the assembly room.

• **For row seats and standing places:**
  two visitors per m\(^2\) of the floor/surface area of the assembly room.

• **For standing on stage rows:**
  two visitors per running meter stage rows.

• **At showrooms:**
  one visitor per m\(^2\) of the floor area of the assembly room.

• **Other standing places:**
  two visitors per m\(^2\) of the floor area
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Model Regulation Governing Places of Assembly

The provisions of this Regulation shall not apply for:

• rooms reserved for religious services
• classrooms in general and vocational schools
• exhibition rooms in museums
• temporary buildings
Model Regulation Governing Places of Assembly

Emergency lighting system must be provided for:

• in necessary stairwells, as well as the areas and corridors between them and the exits to the outside
• in congregational rooms and all areas for visitors (e.g. Foyers, Cloakrooms, Toilets)
• Stage and performance areas
• in the areas for participants and employees with more than 20m² floor space, excluding offices
Building Legislation

Model Regulation Governing Places of Assembly

Emergency lighting system must be provided for:

• in electrical operating areas, in areas for technical systems, as well as flood lights and projection rooms.
• in meeting places outside and sports stadium, which are used during darkness
• for safety sign of exit and escape route
• for step-lighting
Model Regulation Governing Places of Assembly

- Under normal working conditions, an emergency lighting system in non-maintained mode must be present in darkened meeting rooms, on stages and performance areas.
- The exits, corridors and stairs in congregational areas must also be visible in darkness from the emergency lighting.
- For corridors in congregational areas with removable seating, step-lighting is not required, just like in sports stadiums with emergency systems.
Building Legislation Extension: DIN EN 12193: Lighting for Sport Facilities

Pkt. 5.7.1: Emergency lighting for Participants

The safety of the participants is secured, providing the illumination of the emergency lighting system is sufficient to ensure the secure abandonment of a sporting event.
Building Legislation - Extension

DIN EN 12193: Sports lighting

The lighting level for the safe cancellation of a sporting event is a percentage of the illumination level of the corresponding class. This applies to the sports below with the following percentages:

- Swimming 5% for at least 30s
- Gymnastics, indoor 5% for at least 30s
- Riding, indoor 5% for at least 120s
- Cycling (Track) 10% for at least 60s
Building Legislation Extension

DIN EN 12193: Sports lighting

Example 1:
Competitive level: Regional / Local / Training = Lighting class II
Handball acc. Table A.2 = 500 lx in class II
• Emergency lighting (5% for at least 30s) = 25 lx

Example 2:
Competitive level: Local / Training / School = Lighting class III
School sport acc. Table A.2 = 200 lx in class III
• Emergency lighting (5% for at least 30s) = 10 lx

- Swimming baths from minimum depth of 1,35 m
  \[ E \geq 15 \text{ Lux} \] on water surface
Model Regulations for Shopping Facilities

MVkVO applies to the construction and operation of:

- Each shopping facility, its sales area and mall corridors including their components have a total area of more than 2000 m².
Model Regulations for Shopping Facilities

Emergency lighting system must be provided for:

- in necessary stairwells, as well as the areas and corridors between them and the exits to the outside
- in sales areas and restrooms as well as all other rooms for visitors with more than 50 m² floor space
- in rooms for employees > 20 m², except in office rooms
- in electrical operating rooms and area for building services
- for safety signs of exits and escape routes
- for step-lighting
Model Regulations for Accommodation

MBeVO applies to the construction and operation of:
• Accommodation with more than 12 guest beds
Building Legislation

Model Regulations for Accommodation

Emergency lighting system must be provided for:

- in essential corridors and stairwells
- in areas between essential stairwells and exits to the outside
- for emergency signs, that indicate exits
- for stairs in essential corridors
Model Regulations for Car parks facilities

MGarVO applies to the construction and operation of:

- Large, covered parking facilities with **effective areas of > 1000 m²**
Building Legislation

Model Regulations for Car parks facilities

Emergency lighting system must be provided for:

- covered car parks, with the exception of one storey car parks with a fixed group of users. The escape route must be illuminated

- Escape routes are classed generally as:
  - Driving zones
  - Walking routes adjacent to entrances and exits to the car park
  - Stairs leading to exits
Model Guidelines for Skyscrapers

MHHR applies to the construction and operation of:

• Buildings containing residences with floor areas situated more than 22 m above the determined ground.
Model Guidelines for Skyscrapers

Emergency lighting system must be provided for:

- escape routes
- areas around elevators
- emergency signs for escape routes
- Escape routes must be permanently marked and easily visible with emergency signs
- Emergency lighting cannot be replaced by self-luminous escape signs, however these can be used in addition
- Further requirements may be developed from the workplace ordinance
Building Legislation

Model Building Code § 35 Section. 7

Internal Stairwells in Buildings \( h \geq 13 \text{m} \)

- Essential, internal stairwells in buildings higher than 13m are required to have emergency lighting, acc. to § 2, Paragraph 3, sentence 2.

- § 2, paragraph 3, sentence 2: Height is the measurement from the floor level to the higher story, where a recreational area is possible.

- The term ‘Skyscraper‘ is only used for buildings with a height of more than 22 m, acc. MBO.
Model Guidelines for School Construction

MSchulbauR applies to the construction and operation of:

• General educational and vocational Schools, that do not exclusively serve the education of adults.
Model Guidelines for School Construction

Emergency lighting system must be provided for:

• in halls, through which the escape routes leads
• in essential corridors
• in essential stairwells
• all window-less recreation rooms
Model Regulations for Hospital Construction

MKhBauVo applies to the construction and operation of:

• Hospitals and other structures with a corresponding purpose. This applies in turn to health care clinics, providing the purpose requires it.
Model Regulations for Hospital Construction

Replacement power supply:

- In order to maintain hospital operations during a failure of general/normal power/electricity supply, the following facilities (consumer) are required to switch itself over automatically within 15 seconds to the replacement power supply and continue to operate for a minimum period of 24 hours:
  - Emergency lighting
  - Lighting on the inside and, where necessary, the outside traffic route.
  - All illuminated signs indicating the escape route
  - Lighting for all areas necessary to the maintenance of hospital operations, including accommodation, care, examination and treatment of patients. At least one luminaire must continue to operation in each room.
Requirement of the Standards

(Not relevant for Germany)
**DIN EN 50172**

4.4 Anti-panic areas
Areas with escape routes that are not indicated in Halls larger than 60 m² or smaller areas, if there is an additional risk, such as the use by larger gatherings of people. Anti-panic lighting is required to be installed in these areas.

5.4.2 Elevator cars
In an elevator car, which is approved for people, emergency lighting must be installed as anti-panic lighting, in line with EN 1838.
Building Legislation - Extension

**DIN EN 50172**

These sections relate to countries that do not have specific requirements.

A deviation for Germany is defined in Appendix A:

- It applies to the requirements in the workplace.
- The necessity for the use of emergency signs or lighting in particular buildings and areas is regulated by the regional building organisation of each individual state of the Federal Republic of Germany.
- If in doubt, the appropriate construction supervision must be consulted.