

## 8 Safety in use

This section contains the mandatory provisions and general recommendations for Chapter 8, Articles 1, 4 and 9 of PBL and Chapter 3, Articles 4, 9, 10 and 18 of PBF. Section 8:10 also contains mandatory provisions and general recommendations for Chapter 8 Article 7 of PBL.

### 8:1 General

Buildings shall be designed so as to minimise the risk of accidents such as falls, collisions, crushing, burns, explosions, being locked in, poisoning and electric shocks. Sites that are used for development shall be designed so as to minimise the risk of accidents.

*General recommendation*

Rules concerning safety for utility rooms are contained in Section 3:4.

#### 8:11 Scope of application

The rules in this Section apply both to buildings and to sites used for development. The rules for sites that are used for construction are combined in Section 8:9. In certain specified cases, the rules shall only apply to spaces in buildings where children may be present.

*General recommendation*

The term spaces where children may be present refers to such rooms, parts of rooms or spaces where children of pre-school age are allowed to be, or may be, present without permanent supervision of adults.

Examples of such spaces include dwellings and communal spaces in residential buildings such as corridors, stairways, laundry rooms and recreational premises. This also includes guest rooms in hotels and spaces in nursery schools, child care centres, children's clinics, libraries, shopping centres and other similar premises. The special requirements also apply to those circulation routes or escape routes that belong to spaces where children of pre-school age may be expected to spend time.

Boverket's handbook *Bygg barnsäkert – i byggnader, på tomter och i utemiljön* contains additional advice.

### 8:2 Protection against falling

*General recommendation*

Rules for protection against falling through glass are contained in Section 8:352. Rules for protection against falling on sites are contained in Section 8:91. Rules for protection against falling are also issued by the Swedish Work Environment Authority.

#### 8:21 Lighting in circulation spaces

The lighting in circulation spaces shall be designed with sufficient power and uniformity to enable people to move around safely within the building.

*General recommendation*

Rules concerning lighting in escape routes are contained in Section 5:34 and 5:35.

Lighting installations should be designed in accordance with SS 437 01 46. The fixed lighting should not be dazzling.

In public buildings, it should be possible for large glass surfaces facing the outside and windows at the end of corridors to be screened off to ensure that daylight does not dazzle people.

### 8:22 Protection against slipping and tripping

Walking surfaces shall be designed so as to minimise the risk of slipping or tripping. In spaces where an incline, moisture, spillage or ice accretion increases the risk of slipping, the properties of the surface material shall be adapted accordingly. Unexpected changes to the surface material's slip-related properties shall be avoided, particularly when the path direction changes. The surfaces shall be designed without unexpected small changes in level, irregularities or low obstacles which are difficult to detect.

#### *General recommendation*

For dry walking surfaces, the friction factor should be at least 0.30, measured in accordance with SS-EN 13893.

A reference method for testing floor products with more stringent requirements for step safety are contained in SS-EN 13845.

Support handles should be provided in the shower space of the accessible sanitary room referred to in Section 3:146.

Rules concerning the maximum permissible floor incline in shower spaces are contained in Section 6:5335.

Door and gate openings should be designed with no changes in level, unless a threshold is necessary for reasons relating to damp or climate. However, a threshold, where present, should be as low as possible and be bevelled so that it is easy to pass over and so as to minimise the risk of tripping.

### 8:23 Protection against falling from heights

#### **8:231 Openable windows, balcony doors etc.**

In spaces where children may be present, openable windows and glazed panels – e.g. glazed-in balconies – with the bottom of the frame lower than 1.8 m above floor level shall have safety fittings, locking devices or other protection which limits the risk of children falling out. Balcony doors and openable windows where the distance between the glass surface and the floor is less than 0.60 m shall have safety fittings and a locking device to prevent children from opening and going through the door or window.

Safety devices are not necessary on windows or French windows on the ground floor.

#### *General recommendation*

Safety fittings refer to fittings with a lock which can fix e.g. a window in a closed position. The term locking device refers to a device with a lock that prevents a window, for example, from being opened more than 10 cm. Both these devices should be designed to ensure the lock cannot be removed by children, but nevertheless can be used by people with impaired mobility.

Child safety, strength and durability can be tested in accordance with SS 3587 and NT CONS 018.

### **8:232 Stairs, ramps and balconies**

Stairs and ramps in or adjacent to buildings shall be designed to ensure that people can move about safely.

#### *General recommendation*

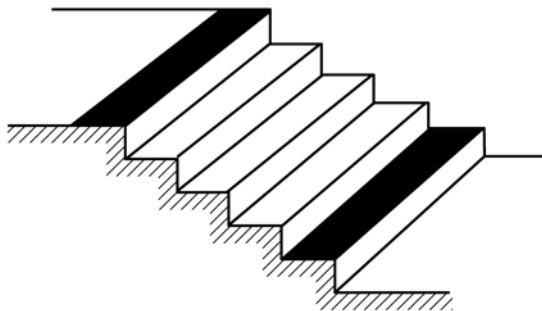
In order for the stairs to be designed safely account should be taken to the incline and length of the stairs and the relationship between the height and depth of the steps. The incline along the walking line should not change within the same flight. There should be no treads which have a height that is different from others. If this cannot be avoided, the step should be clearly marked. The depth of a tread on stairs should be not less than 0.25 m measured along the walking line.

For the design of ramps, see Section 3:1422.

Stairs that are wider than 2.5 m should be divided by balustrades or handrails into two or more flights.

Stairs, except in single-family houses and inside individual dwellings in multi-dwelling blocks, should be fitted with contrast markings to ensure people with impaired vision can detect any changes in level. The lowest tread of a staircase and the corresponding part of the front edge of the landing at the uppermost riser in every flight should have a lightness contrast of at least 0.40 according to the NCS (Natural Color System). The markings should be consistent throughout the building.

**Figure 8:232 Contrast marking of stairs**



The width of a landing should not be less than that of the stairs. Doors on landings should be located to ensure passage is not impeded. In multi-dwelling blocks, landings should be at least 1.5 m deep. Within individual dwellings, landings should be at least 1.3 m.

Strings, skirtings, balustrades, handrails and similar should not encroach on the width of the flight by more than 100 mm on either side. The distance between an enclosing wall and the sides of the flight should be not more than 50 mm.

Stairs and ramps from dwellings and other spaces where people are present other than occasionally shall be designed to ensure stretchers can be carried safely. However, this does not apply if the stretcher can be carried in a lift or other lifting device.

#### *General recommendation*

For straight stairs leading to more than two dwellings, the provision's requirement for the safe carriage of stretchers is met if the flight has a width of at least 1.20 m. For bent or curved stairs a larger turning radius may be required.

Stairs, ramps, balconies and similar in spaces where children may be present shall be designed to ensure the risk of accidents to children is limited.

*General recommendation*

Openings between treads should be not greater than 100 mm.

In dwellings, stairs should be designed to ensure a gate can be fixed at the top and bottom of the stairs.

*8:2321 Balustrades*

Flights of stairs, landings, ramps and balconies that are not bounded by walls shall have balustrades that limit the risk of personal injury as a result of falling.

Balustrade padding and its attachments shall withstand the dynamic effect caused by people.

*General recommendation*

Balustrades on flights should be not less than 0.9 m high. If an opening on the side of a flight of stairs is greater than 0.4 m in any one lengthwise direction and the height of the storey is more than 3.0 m, measured from floor to floor, the balustrade should be at least 1.1 m.

Balustrades on landings in an individual dwellings should be not less than 0.9 m high. If the floor height is greater than 3.0 m, measured from floor to floor, the balustrade should be at least 1.1 m. Balustrades on landings outside of individual dwellings and balustrades on balconies and access balconies should be at least 1.1 m high.

Rules for glass balustrades are contained in Section 8:35.

Balustrades in spaces where children may spend time shall be designed to ensure children cannot injure themselves as a result of climbing or crawling.

*General recommendation*

Balustrades on balconies, landings and flights of stairs should be designed, up to a height of 0.8 m, in such a way that it is not possible to climb on them. Vertical openings should not be wider than 100 mm.

The clear space between the lower edge of a balcony balustrade and the balcony floor, or between the lower edge of a stair balustrade and the nosing of an individual stair should not be greater than 50 mm. The clear vertical space between the bottom of a balustrade on stairs and a landing or floor should be not more than 100 mm.

Horizontal openings above the front of a balcony should be designed to ensure children cannot get their heads stuck. Openings in the range 110–230 mm should be avoided.

*8:2322 Handrails*

Ramps and stairs shall have balance support in the form of handrails. Handrails shall be easy to grip.

*General recommendation*

Ramps and stairs in public premises should have handrails on both sides. Other ramps and stairs with more than three steps should have handrails on both sides. Lower ramps and stairs should have at least one handrail. Within a dwelling, bent or curved stairs that are not more than 0.9 m wide may have no handrail if instead there is a trellis, centre post or similar that can be easily grasped.

Handrails should have a height of 0.9 m. It should also be possible to hold the handrail past the attachment. They should extend beyond the beginning and end of the stairs or ramp by at least 30 cm.

The lightness of handrails in public buildings and stairways in multi-dwelling blocks should contrast with the surrounding surfaces.

Where a continuous handrail does not work because of the special use of the space, such as a gallery, an alternative design of balance support can be made that corresponds to the function of the handrail.

### **8:233 Protection in connection with openings in buildings**

If there are openings in surfaces that are intended to be walked on, these shall be covered by access panels, grating, duckboard or other suitable protective devices. The openings may also be demarcated by guard rails or similar. In spaces where children may be present, access panels, grating, duckboard and similar shall be designed to ensure they cannot be lifted by children and to ensure the risk of personal injury is limited.

### **8:24 Roof safety**

#### *General recommendation*

Rules on utility rooms and access routes to these are contained in Section 3:4.

### **8:241 General**

Buildings with roofs that can be accessed shall be fitted with arrangements that provide protection against falling and therefore against personal injury. Buildings shall have access arrangements in accordance with Section 8:242, unless this is clearly unnecessary.

#### *General recommendation*

Examples of situations where special arrangements for access to and movement on roofs can be considered to be clearly unnecessary are

- where the roof has a low pitch and the permanent workstation is at a safe distance from the edge of the roof,
- where the roof lacks a permanent workstation.

Permanent access and protective devices shall have adequate strength and rigidity and be made of a durable material. Installations intended for lifelines shall be strong enough to guarantee safety in the event of a fall. The strength requirement also applies to the attachments for such installations.

#### *General recommendation*

Permanent devices for access to roofs should be made with a corrosion resistance corresponding to that of hot-dip galvanised steel with a protective layer at least 50 µm thick as described in SS-EN ISO 1461.

Devices intended for the attachment of lifelines should also be able to handle with the dynamic lifeline shock described in SS-EN 516.

Roofs that can be accessed shall have reasonable protection against tripping and be designed so as to limit the risk of putting your foot through the surface of the roof.

#### *General recommendation*

Rules for accessing roofs for professional purposes are issued by Arbetsmiljöverket.

### **8:242 Access devices and permanent workstations**

#### *8:2421 Access routes to roofs*

Buildings shall be fitted with fixed climbing devices to the extent that is necessary to ensure that the access routes are safe. Non-fixed devices may be used if the risk of personal injury is low. It shall also be possible to use access routes for transporting work materials and equipment.

*General recommendation*

If the height of the façade of a building at the point of access to the roof is

- 4 m or less, a non-fixed ladder may be used if there is a device at the eaves that prevents the ladder from slipping,
- higher than 4 m but lower than 8 m, access should be provided, either from the inside or from the outside, via a fixed or telescopic wall ladder with protection against falling,
- 8 m or higher, access to the roof should be provided from the inside via a climbing device.

Where access is expected via an internal climbing device, the access openings should be provided with guard rails so as to limit the risk of falling.

Roof hatches for climbing onto the roof should have clear dimensions of at least 0.6 x 0.9 m (w x h) and wall panels shall have clear dimensions of at least 0.6 x 1.2 m (w x h).

If the difference in level between the top storey or attic floor and the roof hatch or wall panel is greater than 1.2 m, a fixed or telescopic ladder should be provided.

Fixed ladders shall terminate at the bottom so as to prevent children from climbing up them unaided.

It shall be possible for roof and wall panels that do not form part of an escape route to be locked.

*General recommendation*

Rules for escape routes are contained in Section 5:3.

*8:2422 Movement on roofs*

Buildings shall have a sufficient amount of fixed safety equipment between the point of access to the roof and the permanent workstations to limit the risk of personal injury. Resting places shall be arranged if necessary for the transport of work materials and equipment to the workstation.

*General recommendation*

A fixed roof ladder should be provided if:

- the façade next to the access point is more than 4 m high, or
- the pitch of the building's roof is greater than 1:10 ( $\approx 6^\circ$ ) and, at the level of the roof, the distance between the point of access and the nearest roof safety arrangement is more than 1 m.

The building should have a combination of a fixed roof ladder and a walkway at the ridge for movement along the roof if

- the building's façade is more than 8 m high and
- the building's roof pitch is greater than 1:10 ( $\approx 6^\circ$ ).

Chimneys should be provided with a climbing device if the chimney height at the point of access is greater than 1.2 m. If the falling height is greater than 4 m from the workstation to the underlying floor that prevents the person falling further, the climbing device should be provided with a guard to protect against falling. The protective device should be designed so as not to impede the carriage of work materials and equipment.

If moulded roof steps are used as a fixed roof ladder they should be supplemented by clearly marked attachment devices for a lifeline.

#### *8:2423 Permanent workstations*

*Permanent workstations shall be designed with regard to the total fall height, the nature of the work and the risks that are present when the work is to be carried out.*

##### *General recommendation*

Permanent workstations which require regular maintenance should have an accessible surface at least 0.30 x 0.60 m in size. This may be a horizontal surface on the chimney crest or a platform that is not more than 0.5 m below the crest. The guard rail should be not less than 1.0 m high and it should have handrails at the top and at mid-rail height.

### **8:243 Protective devices**

#### *8:2431 Anchorages for lines for safety harnesses etc.*

Protective devices shall be fitted to the extent that ensures personal safety during roof work that covers the whole roof.

##### *General recommendation*

Irrespective of the pitch of the roof, if the façade is more than 3 m high, anchorages for lines for safety harnesses should be provided at the ridge or a correspondingly high part of the roof. If necessary to be able to move around safely on the roof, such anchorages should also be provided on other parts of the roof.

Anchorages may be in the form of suitably designed ridge rails, walkways, attachment rings or other suitable attachment system for lifelines.

On roofs with a pitch not greater than 1:10 ( $\approx 6^\circ$ ), anchorages may be in the form of attachment rings that are not more than 5 m apart, fitted at a distance of not more than 10 m from the eaves.

#### *8:2432 Footholds at the eaves and at changes in roof pitch*

At the eaves, and where the pitch of the roof changes, secure footholds shall be fitted, where the fall height and the roof design so require, sufficient to ensure personal safety.

##### *General recommendation*

Footholds should be fitted when the height of the building's façade is greater than 8 m and the pitch is greater than 1:3. ( $\approx 18^\circ$ ).

#### *8:2433 Protective devices for preventing people from putting their feet through roofs*

Surfaces and fixed devices which may be trodden on by mistake and which cannot support a person's weight shall be fitted with a safety device to prevent people putting their feet through the roof or falling.

##### *General recommendation*

A balustrade at least 0.5 m high or grating on the underside of the opening will reduce the risk of someone going through the roof or falling. Skylights that slope more than 60 degrees or that are raised at least 0.35 m above the roof surface need not be fitted with protective devices.

#### *8:2434 Protective devices providing protection against falling ice and snow*

Protective devices providing protection against falling ice and snow shall be installed at the entrances to buildings if there is a particular risk of personal injury as a result of ice and snow falling from the roof.

*General recommendation*

There is a particular risk of personal injury at the entrances to buildings

- if the building's façade is more than 8 m high, or
- If the pitch of the building's roof is greater than 1:3 ( $\approx 18^\circ$ ).

Examples of the design of safety devices to protect against falling snow are contained in SS 831335.

## 8:3 Protection against collision and crushing

### 8:31 General

Buildings shall be designed so as to limit the risk of personal injury as a result of collision. The parts and devices of buildings that are capable of movement shall be positioned and designed to ensure the risk of personal injury due to being trapped or similar is limited.

*General recommendation*

Parts of buildings and other fixed devices located at a height lower than 2.20 m above the walkway should be built in or specially marked to ensure they do not pose a risk to people with impaired vision.

Swing doors should be designed to ensure it is possible to see through them.

Doors in schools and pre-schools as well as entrance doors to residences should have crush protection.

### 8:32 Fixtures, fittings and equipment

In spaces where children may be present, fixtures, fittings and equipment which are readily accessible to children shall be designed to ensure they cannot tip over and to ensure children cannot be injured by opening drawers or panels or by climbing on them.

*General recommendation*

A drawer with safety fittings or some other safety appliance should be provided for the storage of sharp household implements.

### 8:33 Protection against accidents involving moving devices

Doors, gates, walls, gratings and barriers that are opened by a motor and closed by stored energy or vice versa shall be designed so as to limit the risk of personal injury. This shall also apply to motorised barriers that are both opened and closed by a motor and to manual overhead doors.

*General recommendation*

Manual overhead doors should be attached with through bolts with nuts or similar to structural elements of sufficient load-bearing capacity.

Attachment by hexagon headed wood screws does not comply with the requirement in the provision regarding limitation of the risk of personal injury.

Doors, gates, walls, gratings and barriers manufactured and installed in accordance with SS-EN 12978 and SS-EN 13241-1 meet the requirements of the provisions.

Energy may, for example, be stored by means of springs, rubber bands or as a result of the elevation of the gate.

Provisions concerning lifts, escalators, passenger conveyors as well as doors, gates, walls, grids and gratings that are both opened and closed by

means of a motor are contained in Chapter 5 PBF and in the Boverket's mandatory provisions and general recommendations on lifts and certain other motorised devices (BFS 2011:12), H.

### 8:34 Clear height

The clear height in escape routes, on stairs, through doors and in other circulation spaces shall be at least 2.00 m.

### 8:35 Glass in buildings

Glazed surfaces that are unprotected and positioned in such a way that people can come into contact with them shall be designed to ensure the risk of personal injury is limited. Glazed surfaces and mountings shall withstand the dynamic effect caused by people.

#### *General recommendation*

A test method for resistance to heavy impacts and a classification are contained in SS-EN 12600.

### 8:351 Protection against collision

Large glazed surfaces in doors and glazed surfaces which may be mistaken for doors or openings shall be clearly marked.

#### *General recommendation*

The markings should differ from the background and be visible to people whether they are standing or sitting.

### 8:352 Protection against falling through glass

Glazed surfaces shall be designed so as to limit the risk of falling through the glass.

#### *General recommendation*

The risk of falling can be considered to exist when

- the vertical drop is more than 2.0 m to the underlying ground or floor and
- the distance between the glazed surface and the bottom floor is less than 0.6 m.

Laminated safety glass in accordance with Section 8:353, balustrade or the equivalent may serve as protection.

### 8:353 Protection against cuts

Glazed surfaces shall be designed to limit the risk of people cutting themselves.

#### *General recommendation*

Tempered safety glass in accordance with SS-EN 12150-2 that meets the requirements of at least Class 1(C)2 or laminated safety glass in accordance with SS-EN 14449 that meets the requirements of at least Class 2(B)2 in accordance with SS-EN 12600 should be used in

- glass railings
- glazed surfaces in entrances and circulation spaces if the distance from the lower edge of the glazed surface to the floor or ground is less than 1.5 m
- glazed surfaces in dwellings if the distance from the lower edge of the glazed surface to the floor or ground is less than 0.6 m
- glazed surfaces in other spaces in which children may spend time if the distance from the lower edge of the glazed surface to the floor or ground is less than 0.8 m. Glazed surfaces in doors in schools and preschools

should, however, have tempered or laminated glass if the distance from the lower edge of the glazed surface to the floor or ground is less than 1.5 m.

Where a door or partition is glazed using small panes, glass that is not classed as safety glass may be used.

## 8:4 Protection against burns

Buildings and their installations shall be designed so as to limit the risk of burns.

### 8:41 Heating installations

Readily accessible parts of heating installations shall be fitted with protection against unintended contact if their surface temperature is so high that they may cause burns on contact. In spaces where children may be present special attention shall be given to the risk of accidents to children.

#### *General recommendation*

Protection against unintended contact should be provided if the surface temperature exceeds 90 °C. In sanitary rooms and in nursery schools and after-school centres, readily accessible parts should be provided with protection against unintended contact if the surface temperature exceeds 60 °C.

The specified surface temperatures relate to enamelled or unpainted metal surfaces. Methods for determining the surface temperatures for other materials, which correspond to the surface temperature for metal with regard to the risk of burns is described in SS-EN ISO 13732-1.

Permanently fixed radiant heat sources must be designed to ensure that people in the vicinity may not sustain burns or suffer discomfort.

#### *General recommendation*

Rules concerning the safety of electric radiant heat sources are issued by the Swedish Electrical Safety Board.

For hot water temperature, see Section 6:621.

### 8:42 Stoves, ovens, etc.

Readily accessible surfaces on stoves and ovens etc. shall be protected against contact if their surface temperature is so high that they may cause burns on contact.

#### *General recommendation*

Stoves should have a hob guard that extends at least 0.1 m above the hob and covers the front edge of the stove and its sides up to 0.2 m from the front edge. If the stove is accessible from the side, the entire accessible side should be covered by the hob guard.

The doors of ovens which are lower than 0.8 m above the floor should have safety fittings. The outer temperature of glass doors in ovens and on the surfaces of handles, knobs, buttons etc. of metal that are held for a short time should not exceed 60 °C.

Accessible metal surfaces on stoves and ovens etc. at heights lower than 0.8 m above the floor should have a surface temperature not exceeding 60 °C during normal operation. Methods for determining the surface temperatures for other materials, which correspond to the surface temperature for metal with regard to the risk of burns are described in SS-EN ISO 13732-1.

### 8:43 Protection against scalds

Deflectors shall be placed so as to limit the risk of scalding.

*General recommendation*

A slop sink should be placed along the same line of fixtures and fittings as the stove.

## 8:5 Protection against explosions

### 8:51 General

*General recommendation*

Rules concerning the handling of flammable and explosive goods are issued by the Swedish Rescue Services Agency.

High pressure boilers with an operating pressure greater than 1 MPa and water and steam spaces totalling more than 0.5 m<sup>3</sup> should be located in a separate building. This also applies to larger pressure vessels of other types such as steam accumulators, digesters and gas holders.

### 8:52 Heating installations etc.

Boiler installations or other installations for heating water and other pressurised devices shall be fitted with safety devices which limit the risk of personal injury due to excessive pressure or excessive temperature in the installation.

*General recommendation*

The Swedish Work Environment Authority issues rules on pressure vessels and for the inspection and use of pressure devices.

A sealed boiler installation should be equipped with oil conservator. An enclosed expansion vessel should be sited to ensure heating of the vessel due to natural circulation, convection and radiation is prevented.

Boiler plants and other installations for heating water should be fitted with safety valves that prevent excessive pressure. A boiler plant operating on solid fuel should also be fitted with a thermal safety device that prevents the maximum water temperature being exceeded. When a boiler is fitted with a thermal safety device that requires cooling by water, the installation should be connected to a public water supply and sewage system.

Alternatively, it can be connected to a separate water supply and sewage system that provides secure access to water.

## 8:6 Protection against being locked in

Doors leading to sanitary rooms, saunas and other spaces where someone could be accidentally locked in shall have a closing device so that a bolted or locked door can be opened from both the inside and the outside without a key or special tool.

Saunas shall be designed so as to allow rapid escape. The door shall open outwards or be a swing-type door. The door must not have a lock and it shall not be possible for the door leaf to get stuck in the frame as a result of thermal expansion or the effect of moisture.

In spaces where children may spend time, doors to utility rooms shall be fitted with a closing device so that they can be opened from the inside without a key.

In spaces where children may spend time, doors or locks to freezers, refrigerators and coolers etc. that are readily accessible to children shall have closing devices so that the door or lock can be opened from the inside by a child.

*General recommendation*

The appropriate design of doors or locks which can be opened from the inside is set out in SS-EN 60335-2-24.

Rules concerning protection against being locked in are also issued by Arbetsmiljöverket.

## 8:7 Protection against poisoning

Connections between premises where toxic gases occur and premises where people are present other than occasionally shall be provided only if adequate measures are taken to limit the risk of personal injury due to poisoning.

*General recommendation*

Examples of premises where toxic gases may be present are garages in multi-dwelling houses and stores for certain fuels.

The connection should be sealed and fitted with door closers.

Rules for the isolation, in certain cases, of premises with hazardous substances are also issued by Arbetsmiljöverket. (*BFS 2011:26*)

In dwellings and other similar spaces where children may spend time, it shall be possible for chemical compounds, medicines and similar products to be stored safely.

*General recommendation*

Such spaces should have safety fittings, or access to them by children should be made difficult in some other way. For the storage of medicine and hazardous chemical compounds such as dishwasher fluids, cleaning fluids and petroleum products, a lockable space should be provided, for instance one situated high up in a broom cupboard. For the storage of less hazardous preparations such as mild washing up fluids and detergents, a low level unit with safety fittings or a cupboard placed not less than 1.4 m above floor level should be provided.

In a garage with a net area of more than 50 m<sup>2</sup>, clearly visible signs shall be provided that warn of the risk of carbon monoxide poisoning.

*General recommendation*

The sign should state that it is prohibited to let a vehicle run idle.

## 8:8 Protection against electric shocks

Buildings shall be designed so as to limit the risk of personal injury as a result of electric shocks.

*General recommendation*

Provisions concerning electrical safety are issued by Elsäkerhetsverket<sup>7</sup>.

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<sup>7</sup> Elsäkerhetsverket: The Swedish Electrical Safety Board

## 8:9 Protection against accidents on sites

### 8:91 Protection against falls on sites

Stairs and ramps on footpaths between a building's accessible entrances in accordance with Section 3:132 and parking spaces and lay-bys for cars shall be designed to ensure people can move around safely.

*General recommendation*

Stairs and ramps should have a handrail on one side. The handrail should have a height of 0.9 m.

In order for the stairs to be designed safely account should be taken to the incline and length of the stairs and the relationship between the height and depth of the steps. The incline along the walking line should not change within the same flight. There should be no treads which have a height that is different from others. The depth of the step on stairs should be at least 0.30 m, measured along the walking line. In order to minimise the risk of someone tripping, stairs should have more than two steps.

For the design of ramps, see Section 3:1222.

Stairs, except in single-family houses, should be provided with contrast marking to ensure people with impaired eyesight can detect the changes in level. The lowest tread of a staircase and the corresponding part of the front edge of the landing at the uppermost riser in every flight should have a lightness contrast of at least 0.40 according to the NCS (Natural Color System). The markings should be made in a consistent manner.

### 8:92 Protection of openings in the ground on sites

If there are openings in or at surfaces that are intended to be walked on, these openings shall be covered by access panels, duckboard, grating or other suitable protective devices. The openings may also be demarcated by guard rails or similar. In spaces where children may be present, such access panels, gratings, duckboard and similar shall be designed to ensure they cannot be lifted by children and to ensure the risk of personal injury is limited.

### 8:93 Protection against accidents on fixed playground equipment on sites

Fixed playground equipment shall be arranged so as to limit the risk of personal injury. The ground covering beneath swings, climbing frames and similar playground equipment shall be shock-absorbing and otherwise designed so as to limit the risk of personal injury in the event of an accident.

*General recommendation*

Examples of how fixed playground equipment can be designed are contained in SS-EN 1176-1 and SS-EN 1176-7. Examples of shock-absorbing ground coverings and test methods for shock-absorbing ground coverings are contained in SS-EN 1177.

### 8:94 Protection against accidents involving moving devices on sites

Doors, gates, walls, grating and barriers that are opened by a motor and closed by stored energy or vice versa shall be arranged so as to limit the risk of personal injury. This shall also apply to motorised barriers that are both opened and closed by a motor and to manual overhead doors.

*General recommendation*

Manual overhead doors should be attached with through bolts with nuts or similar to structural elements of sufficient load-bearing capacity. Attachment by hexagon headed wood screws does not comply with the requirement in the provision regarding limitation of the risk of personal injury.

Doors, gates, walls, gratings and barriers manufactured and installed in accordance with SS-EN 12978 and SS-EN 13241-1 meet the requirements of the provisions.

Energy may, for example, be stored by means of springs, rubber bands or as a result of the elevation of the gate.

Doors, gates, walls, and gratings that are both opened and closed by a motor are governed by National Board of Housing, Building, and Planning's provisions and general recommendations on lifts and other motorised devices (BFS 2011:12), H.

## 8:95 Protection against drowning on sites

### *General recommendation*

Chapter 3, Article 5 of the Public Order Act (1993:1617) states that wells, pools and similar facilities shall have the necessary safety devices, depending on where the facility is and how it is designed. Protection to prevent children having accidents is particularly important.

## 8:951 Permanent pools for bathing or swimming

Permanent pools on sites shall have adequate protection to prevent children having accidents. However, a permanent plastic pool or similar with a maximum water depth of 0.2 m need not have special protection.

The discharge openings of pools shall be designed so as to limit the risk of accidents.

### *General recommendation*

Examples of appropriate protective devices for pools and similar which are intended for bathing or swimming may be:

- A fence at least 0.9 m high that children cannot crawl under or climb over. It should not be possible for children to open any gates in the fence.
- A protective cover of tarpaulin or protective netting with a mesh width not greater than 50 mm. The protective cover should be designed so as to limit the risk of accidents.

Where, due to velocity or flow rate design, satisfactory protection against accidents is not possible, the discharge openings should be fitted with grating or similar devices.

## 8:952 Ponds, fixed wells and fixed reservoirs

Ponds, fixed wells and fixed reservoirs that are not enclosed and in which water or some other liquid is stored shall be designed to have satisfactory protection which limits the risk of personal injury due to falls into the water or liquid.

### *General recommendation*

Protection to prevent children having accidents is particularly important. An example of a design that reduces the risk of children having accidents is a flat bank and a net that is fitted at the deepest part of the pond.

Covers and gratings on wells shall have adequate strength. The design shall limit the risk of children having an accident.

### *General recommendation*

Well covers should have a locking device that cannot be opened by children.

### 8:10 Requirements for safety in use in the alteration of buildings

This section contains, in addition to what is specified in Section 8, provisions and general recommendations to Chapter 8, Article 7 of PBL. (*BFS 2011:26*).

#### **8:10:1 General**

Buildings shall be designed so as to minimise the risk of accidents such as falls, collisions, crushing, burns, explosions, being locked in, poisoning and electric shocks.

Buildings shall, following the alteration, comply with the safety requirements for use specified in Sections 8:2–8:8. The requirements may be satisfied in a way other than that specified where the corresponding safety level is still achieved.

However, deviations from the safety level may be made taking into account the extent of the alteration and the conditions of the building. Rules on this are contained in this section and in Section 1:22. However, deviations must never result in an unacceptable risk to human safety. (*BFS 2011:26*).

#### *General recommendation*

When making alterations you should aspire to the same level of safety as for construction of new buildings. Factors that may justify a different level of safety could be that the measure damages the building's cultural values or the building's architectural and aesthetic values.

That the safety level is acceptable can be verified through a risk assessment. The assessment should show why a lower safety level is selected, the risks this involves and what can be done to minimise them. In the assessment, the proposed use and those who have access to a certain space should be considered.

When altering a building, the requirements cannot be lower than what applied when the building was erected. To verify that the building meets this safety level, you should review the current safety devices to ensure that they have for the most part retained their original functionality. Attachments of balustrades and other protective devices in particular should be checked to ensure they have not been weakened by factors such as corrosion, wear or cracking.

Additional rules on safety in use are included in Boverket's mandatory provisions and general recommendations on easily eliminated obstacles, to which and in premises where the public has access and in public places (*BFS 2011:13*), HIN.

Additional rules may also be made for the modification of lifts, escalators, waste transport devices, motorised gates, ski lifts and more. Improvements to roof protection devices and some gates may be required in older buildings, no matter what changes are planned in other respects.

Rules for electrical installations are issued by the Swedish Electrical Safety Board. They also include requirements for alterations to buildings. (*BFS 2011:26*).

#### *8:10:11 Protection against falling*

#### *General recommendation*

Structural elements such as thresholds, support handles in shower rooms, contrast marking of stairs, floor surfaces. Balustrades, handrails and similar devices should be designed to ensure that the risk of falls is limited.

Stairways are often an essential part of the building's historical value. For alterations, the existing stairs may be acceptable if no other changes are

made in the stairway. The existing stair balustrades may also be acceptable, with possible additions, if their safety is judged to be acceptable. (*BFS 2011:26*).

*8:10:12 Openable windows, balcony doors etc.*

In spaces where children can be expected to spend time without constant supervision by adults, openable windows, balcony doors and the like shall be fitted with safety devices as specified in Section 8:231, unless there are exceptional circumstances. (*BFS 2011:26*).

*General recommendation*

Exceptional circumstances may be that the measure would significantly harm the building's cultural values. (*BFS 2011:26*).